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ABSTRACT

Intended for parents of gifted and talented children, the book provides enrichment suggestions in the areas of art, geography, reading and language, math, music, and science. It is emphasized that the activities should be relaxed and fun. Art activities include visits to see art, photography, trying various art techniques, and learning about the schools of art. Geography experiences are organized under headings such as the compass, three dimensional maps, topographical models, and planning a weekend trip. A large number of reading and language activities include sharing stories aloud, making book jackets, planning and performing a puppet show, collecting books, making a time line, and creative writing. Math projects described include kitchen mathematics, purchase of floor coverings, a bank account, the stock market, and probability. Such suggestions as learning to play a simple instrument and visiting musical performances are described in the section on music. A large section provides suggestions for science activities including plant experiments, use of a microscope, ecology, weather, machines, and space science. (DB)

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everyday enrichment

for gifted children at home and school

by Herbert Kanigher

Sponsored by: NATIONAL/STATE LEADERSHIP TRAINING INSTITUTE
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FOREWORD

by Jeanne Delp, co-author of *The Gifted and Talented: A Handbook for Parents*

Leave your kid alone!

This may seem a strange introduction to a book on activities designed for participation with your gifted child. But there is a good reason for my emphasis. Too often the parents, and sometimes teachers, also, become overwhelmed and overly-conscientious about their responsibilities toward the gifted child. This is natural and can be good. But somehow this wonderful love and concern for the bright child must be tempered with a certain amount of hands-off philosophy.

Naturally, I wouldn't be writing a foreword to a book of enrichment suggestions if I didn't believe the contents would be helpful in meeting the educational needs of gifted and talented children. I think the ideas are excellent. However, there is one danger.

Some magazines I read are so full of decorating, cooking, traveling, mind-expanding, political, spiritual, and fashion ideas—***Sunset*** is my favorite example—that I feel exhausted just reading them. How can I do all those marvelous things? Am I negligent not even to try? That's exactly the reader reaction that I want parents and teachers to avoid in gifted education.

I have tried to imagine who will be using this book. For example, Linda and LeRoy Martin, who have just learned that their first grader, Sara, has been identified as gifted and talented, may purchase this book. Sara is the youngest in a family of three girls—all outgoing, intelligent children brought up in a warm, caring family. LeRoy is a college professor and Linda, a college graduate, is active in community affairs. Now that Sara has been singled out as the "star" of the trio of sisters, her parents will strive to meet this new challenge. They are reading all they can find on giftedness, have joined the local parents' group, and will sign-up Sara in the summer enrichment classes.

What I don't want the Linda and LeRoys of the world to do—or to think they have to do, which could even be worse—is to plan a structured program for their child following every activity and suggestion they come across.

I would suggest that the Martins, and other concerned parents and teachers, read through the book first, marking activities that appeal to their situation. Mark the pages with a paper clip or something so the activity can easily be found again when the right time comes. Since Sara has already showed interest in foreign cultures, the geography section on travel information will probably interest her. As she grows older, she will choose activities on her own. The Martins can also try to include in their plans the two older sisters, if they are interested in the projects, to make the learning a family experience.

And, again, I urge parents to leave their gifted child alone sometimes. The gifted child needs time to be alone—to daydream, if he or she is a visionary; to "waste time"; to doodle with pen, musical instrument, or electronic equipment; to think; to read comic books or encyclopedias; to grow; and to do many more things than I can think of right now.

When the gifted child comes looking for direction, for ideas to follow, for more knowledge to sift through his or her mind, that's when these suggested activities can benefit parents, teachers, and child. These suggestions will definitely fill that need.

Teachers of gifted and talented children also can pick and choose from these activities. Many projects lend themselves very well to classroom situations and can be exciting instruction for gifted students. But, please, not ***all*** for each child. That's what I mean when I say, "Leave the child alone." My main concern is to avoid a kind of "overkill" which I have observed in parents and teachers of gifted children. My suggestion is to talk with, listen to, observe, love, and then gently lead your gifted child.

FROM THE AUTHOR

For the last 12 years I have worked closely with gifted and highly gifted students in pre-school through high school as teacher of the gifted, consultant for the gifted, and public school administrator. These experiences have ranged from teaching self-contained classrooms of gifted and highly gifted boys and girls to coordinating programs in 104 schools. I have had opportunities to address college and university graduate classes, write curriculum materials for exceptional children which were utilized in 625 schools, appear on a year-long television news program with gifted students, and appear in filmstrips and sound motion pictures shown nation-wide to groups of educators.

As a teacher of self-contained classrooms, a traveling teacher between two schools with large numbers of gifted students, a center teacher of gifted to which 500 gifted students were bused on a regularly scheduled basis, and as a consultant for the gifted, I found teaching ideas to be as rare as teaching materials appropriate for gifted students.

Anyone with an interest in gifted boys and girls soon finds that these students learn at a rapid rate. They also learn concepts and ideas in more depth. The problem becomes how to provide for this greater breadth and depth. Far too often, an appropriate curriculum is conceived as a difficult book or as more problems in the book the rest of the class is using. Obviously, this is not the answer for the qualitative difference required by the capable student.

Gifted boys and girls need a challenge at their higher level of thinking. While the acquisition of facts and figures is important, the love of learning and an acquired skill for the process of learning warrant the primary emphasis.

The activities in this book focus on that all-important process of learning. The emphasis is not on right and wrong answers. The stress is placed on the process of thinking. Such simple learning activities as planning dinners for a week using the shopping specials in the newspaper provide a challenge for the young gifted student. A visit to the local market to compare the varied containers in which food is packaged results in meaningful learning.

The student's local community is replete with rich experiences. The parent and child need only visit the local retailers to learn about the many facets of merchandising. Research can be done on the acquisition of raw materials, pricing policies, distribution of merchandise, display, clearance sales, and the other components of trade.

I would like to emphasize to you as a parent of a gifted youngster that you are capable of conducting the learning activities in this book. However, you need not attempt all of them. Pick and choose the ones which are most appropriate for your child and his or her interests. No elaborate equipment or hard-to-acquire supplies are required.

Begin a close, learning relationship with your child immediately. Unlike attempting to help your child complete homework assignments, teaching reading, or working mathematics problems, these activities are relaxed and fun.

For a long time parents and guardians have been unsure about their role in the education of their children. Many attempts to teach children at home have led to frustration on the part of both the child and the adult. Help has for the most part been limited to assistance with homework. This role has placed the adult in a negative light as the person who forces the child to continue his or her school work at home.

Today parents are more involved in private, public, and parochial schools than ever before. This involvement includes membership on advisory councils, participation in parent clubs and associations, and assistance in the classrooms and should be encouraged to expand.

It is vital, however, that parents return to active involvement with their own children, preferably at a time when the child is young and especially if the child is gifted. This involvement should focus on fun-type project activities. The subject matter is often less important than the process of involvement. The warm and friendly relationships between the parent and the child, with heavy emphasis on communication, will make the efforts very worthwhile.

Every parent ***can*** teach. The parent of the gifted child has a very special opportunity to broaden the learning horizons of the child who is a potential leader of our country; a future scientist; an award-winning writer; or one of many accomplished and notable figures.

This book has been written for one or more parents (or guardians) and the term "the two of you" is not meant to be restrictive, but could easily apply to "the three or four of you." Teachers are not meant to be excluded either, for many of the ideas will work admirably in the classroom. In describing some of the projects which appeal to older students, I have addressed them directly, rather than the parent or teacher. I have purposely left off any suggested age for the projects since gifted children vary in their stages of development.

The good beginning that you parents make with your child today, will lead to many future months and years of good communication. You will have some very special things in common with your son or daughter; the communication bridge will be built; you will enjoy your child more and he or she will enjoy you more. For it all begins with you, your child's first teacher.

H.K.

CHAPTER I: LET'S START WITH ART

More of a Good Thing

You can start your new program of involvement with your gifted child in the subject area of art. It is one of the subjects which receives less attention these days because of the strong emphasis on reading and mathematics. Some of the exciting art experiences that your child has in school are unfortunately not repeated for the rest of the semester because of time limitations.

Visits to See Art

You and your child are fortunate: art is all around you waiting to be enjoyed. Some of the more common locations the two of you can visit are the following:

1. Museums
2. Art Centers
3. Exhibits at Fairs and Festivals
4. Art Stores
5. Civic Buildings
6. Colleges
7. Universities
8. Occupational Centers
9. Cemeteries
10. Private Homes
11. Restaurants

Simply by visiting places where art works can be found, a mutual bond will develop between you and your child. On these visits, discuss what each of you likes and why.

Develop Some Art Principles

A project involving principles such as line, form, color, and perspective can add to your art growth. Together you can notice how some art utilizes thin lines while other works have both thin and broad lines. In some pieces, thicker lines add force and clarity. Thinner lines have a light and airy dimension in their use. Line can separate parts of art works into more distinct parts.

Form, like line, displays itself in most art works. Shape can make some important figure stand out and catch your eye. It can show a large area in a picture. Sometimes it can be vague and hard to define while other times it is very definite. It can represent a house or tree with only a rough outline.

Color brings out objects. Houses look bigger and more inviting. Animals seem to appear more real. Trees show all of their brilliant features. Some art employs realistic use of color. Other works use color in novel and unusual ways. What happens to objects in the background when light, indefinite colors are used? What do color washes in the background produce? Are the objects in the foreground brighter than those behind them? Can the same color have different shades? Can a small bright object seem as dynamic as a large dull one? What happens to your eye when a color is used in different parts of the same art work?

Why is perspective used in art? Notice what happens to objects when they are far in the background. Observe the size of trees in the foreground compared with those in the background. Who is larger, a person in the foreground or one in the background? Can you find an example of a person being shown in a picture larger than a tree, building, airplane, or other large object?

Black and White

The two of you can study black and white photography. How does the photographer use line, form, shape, and perspective to make a work of art out of black and white pictures? How does the local newspaper attract your attention with black and white pictures? What part do the art principles play in this attraction?

Shading

Have some fun with shading. The two of you can draw some simple objects and then shade them to create the illusion of roundness, squareness, rectangularness, and others. You can shade to show that the sun is in front of an object, behind it, near a side of it, or even not shining on that particular day. Shading can show texture: a smooth surface, a rough area, a sunken cheek, a hole in some fabric, a patch of grass, a grassless spot, and many other impressions.

Try Out Some Techniques

You and your child can plan a picture on a piece of paper. One of you can place a center of interest. The other can add background. Foreground can be included. Then colors can be added: interesting colors to make the center of interest stand out; duller, less interesting colors to create the background area. Now, how about some bold lines? Add some fine, thinner ones, too. Shading can show the time of day or night.

This time, cut out shapes from a magazine. Place one shape in the foreground on the left-hand side. Cut another shape and place it on the right. Can you make the two shapes balance? What do you have to do to balance a very large shape on one side with a smaller shape on the other? Can location of the smaller shape make a difference? What happens if you add several smaller shapes on the side across from the large one? Cut out clouds, mountains, buildings, animals, and other objects. Place them in your picture. Cut out background colors. Cut out some foreground ones, too. Does your eye move along from one object to the next? Does your center of interest attract your attention? Are the foreground colors more exciting than those in the background? Does your picture tell some kind of story? Is the picture realistic or on the abstract side?

Buy Some Art

What kind of pictures does your child have in his or her room? Are they ones that the child selected or even likes? Why not change one of them? Here is a good opportunity to have some of the prior experiences that the two of you have had together come into focus. Discuss the room, its furnishings, the color scheme, and other points. What kind of art would add interest to the room? Would you like exciting art or do you relax in the room and want a peaceful atmosphere?

Cement the relationship between your child and you further by spending an afternoon or even longer looking for just the right picture for his room. The purchase doesn't have to be a large one. A nice reproduction can be a wonderful piece of art for the room. All the time that the two of you are looking at different art examples, think of your art principles. See if you can notice the difference between quality art and work that is done in mass production with little attention to quality. Which art pieces have the same characteristics? Are they by the same artist? Does this artist use some of the same techniques over and over again?

If the right piece of art was hard to find today, then this will be a good opportunity to spend another pleasant afternoon together later in the week or next week. Did you discover that certain stores have better reproductions than others? Do some stores display their art more artistically than others?

Photography

With an inexpensive camera, and your art experiences to date well in mind, a camera can turn out another form of art. Begin with black and white film. Decide what the two of you would like to photograph. Be sure that you plan a center of interest. Have some secondary center or centers of interest, too. Try to eliminate a lot of eye-catching details in the background; the center-of-interest should attract the viewer's eye.

Experiment with distance. Photograph each other close up and far away. Photograph houses, office buildings, clouds, ponds, lakes, mountains, animals, and other interesting objects.

Stand above some objects when you photograph them. Lie on the ground when other snapshots are taken. Photograph at eye level. Focus in on a profile. Emphasize a portrait. Do a study of poses: sitting, standing, walking, holding an object in one hand, holding an object in both hands, catching a ball, throwing a ball, and others.

Study shadows: those in the early morning or later in the day, some in the evening, shadows on bright days, those on overcast days or on days when the sun is shining with many clouds in the sky. Photograph objects that cast shadows: trees, buildings, machines, animals, telephone poles, billboards, mobiles, plants, fences, mountains, toys, and others. Try to have your pictures utilize shadows to make them more interesting.

Now experiment with the more expensive color film. A new world should open for you and your child. The all important component of art, color, is at your finger's touch.

Plan each photograph carefully. Intentionally find an interesting object to photograph. Be sure that its colors add interest to the composition of the picture. Plan for an appropriate background. Include a nice, blue sky if you can.

Photograph a group of people dressed in bright gay colors. Snap a picture of bottles with colorful soft drinks. Capture boats on the ocean or lake. Show birds. Photograph trees and colorful plants. A large variety of flowers can add their beautiful colors to your photographs.

Have some of your best photographs enlarged. Notice the effect of increasing the size of the photographs. Have some pictures reduced to wallet size. How are the enlarged and wallet size pictures alike? How are they different?

Start a photo album. The two of you can have an enjoyable experience shopping for the right one. It should have enough pages to hold a large number of photographs. It should have enough pages which can be mounted with snap shots easily and conveniently. Perhaps you will want to purchase one album for special occasions and another for general photographs. Maybe weekend trips will make up one album. Captions above or below each picture will help you remember the dates and events shown. Artistic arrangement of the photographs will add to the beauty of the album.

As the two of you grow in your knowledge of photographic methods, better equipment can be purchased. This is something that can be carefully planned. The advantages and disadvantages of various cameras, in your price range, can be weighed. Information about shutter speeds and lens qualities can be included within the purchase decision. At any rate, you and your child will put your two heads together to make the appropriate choice.

Later, filters can be explored to meet your needs for special snapshots taken under differing conditions.

Photography is a wide-spread interest which can easily establish a sincere interest between you and your child. As the youngster grows and matures, so can the quality of this project involvement grow and mature.

Schools of Art

Following some discussion about the possible development of art, you and your child can visit the local library to find a few books about how art did develop. This investigation can include why early art was used, what art did that language was not adequate to do, how early man prepared and used paint and bushes, and where the painting was done. This is a natural lead-in regarding what types of early animals no longer exist today. The dwellings and clothing are also worthwhile discussion and research topics. Utensils, weapons, pets, food eaten, hair styles, home decorations, numbers in households, bedding materials, tasks of various family members, and an endless list of learnings can be uncovered from a study of this earliest art. It can be experimented with at home. The two of you might compose a picture-story about some exciting thing that you have done or would like to do. The event can be drawn on a piece of paper. Show it in the sequence in which it happens. For example, you might want to describe (in art) a trip to the library to gather information. Draw your home. Indicate how you traveled to the library. Add any special feature that you observed on the journey; a fire station, a hospital, or an amusement park. Sketch a picture or symbol of the kind of day it was: sunny, cloudy, or rainy. Draw the library. Many of these picture-stories can be developed for fun. Take turns drawing stories, like the one described, to tell the other person where you are: at school, at work, at the supermarket, or at the post office. If you're planning to go to several different places before you return home, all the better; the story will be a greater challenge to the other person.

Such schools as the following can be studied by the two of you as a truly educational experience: Classic, Renaissance, Baroque, Rococo, Impressionistic, Modern, Cubistic, and others. Each school parallels important historical developments: discoveries of land, scientific discoveries, events in politics, changes in philosophies, and others. The schools of art have direct relationships

to schools of music. In fact, many of the names of schools of art have the same names given to schools of music: Classic, Renaissance, Baroque, Rococo, Impressionistic, and Modern.

It is interesting to discover which men and women were famous for their art during the various periods. Exciting research can uncover the kinds of materials on which people painted and drew. The types of brushes, and how they were made, provide further interesting study. The preparation of paint adds interest and variety to the study.

Sculpture, in its many forms, offers three-dimensional novelty to your project. The two of you can explore single and group sculpture, relief and intaglio, busts and full-size, wood and stone, marble from Italy compared with local stone, and the tools used in this art form. The development of sculpture from its early beginnings to modern time provides other avenues to explore. The change in materials used in this art area add to the versatility of sculpture: stone, wood, metal, plastic, in addition to others.

You and your child can sculpture for fifty cents or less. Purchase a few pounds of plaster of Paris. Mix a small amount of this material with plain water and stir until the mixture is the consistency of thick cream. Pour the mixture into an empty quart milk container. Allow it to dry and harden for one day. Peel the paper off and a block of plaster will stand before the two of you.

With tools as simple as a butter knife, a table fork, a toothpick, a paper clip, and a thumb tack, you are ready to sculpture the block. First, consider what object you wish to craft. Then draw the object in pencil, as an outline. Show what areas will be carved away and which will be untouched. This will be a good way to use the shading techniques which went into your drawings and paintings, earlier. Carve away the shaded parts as much as you wish. After all of your simple tools have been used, smooth the piece with fine sandpaper. The white plaster is beautiful by itself, but you may wish to paint the work with a brush or spray can.

The two of you can do single objects and groups. Show people in action: running, jumping, bending over, reaching with one hand, reaching with both hands, kicking, dancing, and stooping. Show people engaged in outdoor activities: fishing, shooting archery, swimming, riding horses, playing baseball, playing football, playing basketball, and others.

As your skill increases, approach such challenging experiences as carving hair of various lengths, adding clothing of varied styles, adding rings, earrings, watches, and coats.

Purchase or make some of the standard carving tools: V cutters, U gouges, files, rasps, and chisels. Explore the range of these tools. Identify their limitations. Notice the different results from applying differing amounts of pressure on the tools.

Experiment with wire. Use different thicknesses of wire. Form simple figures. Form pairs of figures. Show how these figures interact with each other: dancing, shaking hands, carrying heavy objects, a dentist working on a patient, a doctor with a patient, a sales person and a customer, and other pairs of persons. Show three or more persons. Use wire to show various shapes. Make some shapes common ones and other creative designs. Experiment with modern art. Have some figures and shapes represent everyday things.

When your best wire sculpture has been completed, prepare another mixture of plaster of Paris. This time, however, prepare it a little thicker than water. Cut pieces of old cloth into three inch strips. Dip these strips into the mixture, one at a time, and carefully cover all of the wire pieces. Be certain that you wrap the cloth tightly so the shape of the wire stays the same. When the plaster has dried on the cloth, you will have a sculpture of wire covered with a very hard cover. Tap the sculpture; it really is quite solid. As before, you can either leave the work white or paint it to suit your tastes.

Wood sculpture is unlike carving in a block of wood. In wood sculpture, scrap pieces are cut to varying lengths. Odd shapes and designs are cut from other scraps. A square or rectangular piece is selected to be the base for the sculpture to stand on. The first piece is glued to this base. Another piece is glued to the first. Different lengths and shapes are arranged until the work is complete. Select a different topic and make another sculpture. For modern art, one or two pieces of wood—perhaps of different sizes—can be selected for the complete work. In other more traditional works, buildings, trees, figures, mountains, lakes, rivers, machines, or other objects may be shown.

One medium which always appeals to youngsters is clay. It is readily available for a small amount of money. Many of the topics both of you selected for the other sculpture projects can be chosen for clay forms. Because it is such a flexible medium, it can be rolled, squeezed, cut, added on, scraped off, coiled, and more. It hardens when dry. Scrapes can be put into a little dish with water and brought back to their former flexible state.

Clay can be cut with cookie cutters, dried, painted, and glued onto a board or board covered with fabric. Simple bowls can be formed by long coils or pieces of clay formed and then rounded. These bowls, when dry, can be decorated with paint.

Clay forms can be covered with tiny pieces of newspaper dipped into a watery solution of flour and water. When the clay has been completely covered with newspaper, paper towels can be torn into bigger pieces and dipped into the same solution. These, too, are applied to the figure. When the outer cover is dry, cut a slit along one side of the figure. Carefully pull the clay out. Cover the slit with the same technique described before with newspaper scraps and the paper towel pieces. Finally, paint your art work.

To further increase the value of the study of schools of art, a scrapbook can be kept showing samples of each type of art. Samples of sculpture can be included with drawings, paintings, architecture, and other evidence of the periods of time which they cover.

Architecture

A fascinating area of art study is architecture. Within easy walking or riding distance, in every large or small city or town, is a wide variety of homes, office buildings, factories, civic facilities, parks, museums, and other representative samples of our civilization.

The prior study of the schools of art has developed some background for your pursuit. Throughout history, structures have offered decoration reflecting religious beliefs, the carrying out of commerce, and leisure hour occupations.

A first project might be a study of your own home or apartment. Together, draw your child's room floor plan. Develop symbols for furniture, doorways, light fixtures, pictures, and other elements. Then develop a plan for the entire house. Don't forget to show the exterior as well as the interior.

Next, select a piece of cardboard or other stiff material to serve as the base of your model. Following the floor plan, construct the walls of your house or apartment. Furnish the facility with miniature pieces of furniture. Add pictures, rugs, and other items.

Construct a roof. Be sure that the roof can be lifted off and replaced. Individual pieces of tile (formed from red clay), wood, or asbestos shingles can add realism to the roof and also serve as a good lesson about protection from the elements.

Add landscaping to your model. It is fun to develop miniature bushes, flowers, trees, decorative rocks, and other components in your exterior plan.

If you live in an apartment, your unit can be designed and developed into a cut-away while the other apartment units remain fixed. The landscaping for the entire building can still be considered your exterior.

Other exciting models can be designed: an office building, a museum, a police station, a fire station, a city hall, a church or synagogue, a baseball field complete with the bleachers and club house, a football stadium, a basketball stadium, a swimming stadium, and many others.

Airplanes, trains, buses, automobiles, ships and boats, and other means of transportation can be designed as an extension of your achitecture unit. Futuristic models of buildings and means of transportation can incorporate some very imaginative thinking. This, too, can be a good extension of the prior projects associated with drawing, painting, and photography.

Mobiles and Stabiles

A project which involves the principles of balance and aerodynamics along with art is the design of mobiles. A wire coat hanger on which thread is tied to support objects of different sizes and shapes, along with a piece of string with which to hang the instrument, will have you well on your way with the project. Geometric shapes fashioned from paper, wood, plastic, metal, cork, leather, cardboard, and other materials, provide a simple mobile idea. Planets of the universe placed around the sun make up another theme. Additional themes could include: members of your family (with photographs of each on the respective mobile pieces), kinds of sport activities, animals, airplanes, trains, boats, automobiles, trucks, motorcycles, months of the year, seasons of the year, flowers, trees, buildings, friends of the family, occupations, hobbies, and others too numerous to list.

The stabile doesn't revolve. It remains in a fixed position. Any of the themes mentioned in conjunction with the mobiles can also serve as themes for stabiles.

Both mobiles and stabiles can serve important purposes other than decorating in the home: remind you of important events each week or month, remind you about dental care, motivate you about cleanliness, indicate proper air circulation in the home, provide a test of how much dust is present at different heights, show the resistance of particular colors to fading, and serve to demonstrate which colors attract your eye most.

Art in Your Backyard

The two of you can collect a variety of leaves, twigs, flower petals, stems, roots, and other natural materials in the yard. Many things can be done with these items to increase your fun with art.

Leaves can be pasted between two sheets of wax paper to form a pleasant lamination. This can be hung in the house as a stabile or be part of a mobile. In the latter case, several laminations will be necessary.

Leaf prints are quick and easy. Dip a brush into tempera paint and lightly cover a leaf with the substance. Touch the painted side of the leaf to the paper and a print will appear. Repeat the process using other leaves in your collection. Paint some of the leaves different colors. An interesting picture will result from the series of individual leaf prints. In place of paint, stamp pad ink can be substituted.

A variety of the natural materials can be glued to a piece of paper and then covered with a single sheet of wax paper. The materials can also simply be glued to a piece of paper as a one-step operation. Another alternative is to glue the materials to the piece of paper and paint over the entire surface of the paper with watercolors. This can be done before or after gluing the materials to the paper.

Tissue Projects

Art tissue-paper colors are vast. All of the primary and secondary colors are available at stores where art materials are sold. Tissue paper offers numerous exciting activities.

Paper flowers are going into more and more vases each day. Simply by cutting one or more colors of tissue paper into circular patterns, and poking a straight piece of wire through the center, a beautiful flower can be made. The wire below the flower petals can be wrapped with green tape to add the natural color to the item. Leaves can be cut out of construction paper, glued to the ends of pieces of shorter lengths of wire, and taped to the stem below the petals. A little circle of construction paper can be glued into the center of the flower to complete the project. Different types of flowers can be attempted. The experience serves to provide a good education about the different kinds and constructions of flowers.

Pieces of construction paper, cut out in the shapes of the states, can eventually become a map of the United States.

Pieces of tissue can be cut into various geometric shapes and then glued to white art paper. A moist brush, containing only water, can be swept over the pieces of tissue to induce them to bleed their colors. The result is a mixture of bright hues.

Pieces of tissue can be cut in the shapes of various centers of interest and background objects. The tissue pieces are then glued to a piece of paper. Finally, a felt-tip pen or brush with paint bring the outline of the objects into focus when they are used to trace around each object. The pen or brush can embellish the picture by adding detail to the tissue shapes: eyes can be added to human or animal figures; wheels can be shown on vehicles; ridges can be added to mountains and hills; leaves can be shown on trees.

Cellophane

Circles can be cut from different colors of cellophane. One color can be held up to a flashlight. Another color and even a third can be placed over the beam of light to note the effects of color mixing. The secondary colors which develop can be paired with still other colors to form more colors. The results of mixing light and dark colors will create interesting results. Always, when a number of colors are added together, the resulting color is darker than the original color. When using paint, what happens when white is added to darker colors? What happens when black is added to other colors? Which colors are really not considered true colors? What are the neutrals?

Mixed Media

Remembering your knowledge about line, shape, perspective, balance, and other important art elements, plan a picture using mixed media. Use tissue, leaves, twigs, stems, petals, fabrics, cellophane paper, and paint. Notice the effect of using mixed media. Is the picture as two-dimensional or flat as the pictures you have made using only paint?

Experiment with your various media. Use fabrics and tissue together by themselves. Use leaves and cellophane paper. Use paint and fabrics together.

Hobbies in Art

A variety of exciting kits are available in department stores and other outlets which promise hours of fun. Don't overlook the fun of stringing Indian beads on thread or wire to form rings, bracelets, and necklaces. An incidental history lesson can develop from a study of the patterns that are used by different Indian nations. The patterns are found in their jewelry, blankets, clothing, pottery, and other items.

Other interesting kits which give the purchaser careful directions about their use include woodburning, macrame, paint by number, pastic moulding, and others.

It is a pleasing experience to investigate the experiences of some of these kits. They offer a chance for your child and you to discover the fun of figuring out the directions, planning the art activities, doing the projects, and enjoying the results.

You've Made a Start

Through the art experiences mentioned in this chapter, you and your gifted child have been drawn closer together in purposeful activities. You've seen a side of each other that possibly wasn't there before. You have studied a subject, in depth, which is present everywhere in your lives. You have new-found knowledge which was pleasantly gathered, together. Some of these projects were one-time experiences while others will continue through the weeks, months, and years ahead.

CHAPTER II: FUN EXPLORING WITH GEOGRAPHY

A World of Experiences

Another subject area which lends itself to active exploration and involvement is geography. Like art, this area is all around you. Some geographical features are visable from every window and roof top. Maps are available for the sky, the earth, the seas, the planets, transportation, natural resources, and hundreds and hundreds of other topics.

The Compass

An inexpensive compass can lead you and your gifted child into a broad area of geography, direction. Notice the four major points on the compass: north, south, east, and west. Look further. You'll see that in between these four points are mid-points. Each direction, therefore, is open to more precise description: north-east, south-east, north-west, south-west, and others.

Discuss why the compass was invented. How does it help the sailor? How does it help the explorer on land? How does it help the astronaut?

Examine several different kinds of maps. Note that there is a compass on most maps. Which direction is the top of the map, always? Which direction is the bottom of the map, always? Which direction is to your right? Which direction is to your left?

Make Your Own Compass. Rub a sewing needle across north or south pole in one direction. Repeat this 10 or 15 times. Remember: you are only rubbing the needle across one pole, in one direction.

Touch the needle to some steel pins. If the needle attracts one or more of the pins, you've created a magnet. Now place a circular piece of paper or light cardboard in a measuring cup full of water. Lay the needle across the paper or cardboard. Draw a compass close to one end of your needle, you have created a liquid compass. You can also place the needle on a long piece of thread (12 inches or longer). Suspend the thread from some firm object: a lamp, a chair, a table, or some other thing. The needle should now be hanging freely by the piece of thread. Bring the compass close to the needle and observe the reaction.

Which End Is North? Place the north end of a magnet next to one end of your needle on the paper or cardboard. Because opposites attract, if the end of the needle comes in line with the north end of the magnet, the end of the needle must be south. If the end of the needle turns away from the north pole of the magnet, the end of the needle must be north.

Why Use Maps?

Now is a good time to take a walk into the neighborhood with your child. The two of you can note that buildings have permanent locations; these are marked by addresses. There are also special types of facilities: fire stations, libraries, police stations, parks, and other special centers. The neighborhood also has small businesses, some service agencies, movie and other entertainment facilities, and many, many more unique locations.

A lively discussion can develop about how the neighborhood or general community can be recorded—each place being carefully identified and located. Review the project which involved making a floor plan of the child's room and the entire house showing the interior and exterior regions.

Together, using a large sheet of butcher paper, plan the record of the neighborhood or community. Be sure to draw in the street. Show each intersection. Allow enough space on each street to enable you to place all of the major buildings. Show the park and outdoor regions. Liven the map with colors.

Symbols Are Important

It's possible to have a legend or key in one small corner of the map; usually, it's located in the lower right-hand corner. The lower left-hand corner is just as satisfactory. In the legend, show a color for each object on your map. If you have two parks, and green is the color you've selected for parks, color each of the shapes representing parks green. If red is the color you've chosen for fire stations, then color all fire stations red.

In place of colors as symbols, you can use actual shapes. For example, every library on your map can be represented by a rectangle. Then, when you develop your legend, draw a small rectangle. Place a few dots after the shape, and write the word "library". Anyone looking at your legend will immediately know that all shapes on your map which are rectangular stand for libraries.

A World of Symbols

There are scores of map symbols: railroad crossings, bridges, cities of a million, cities of under a million, cities of half a million, dams, parks, rivers, steam plants, lakes, streams, waterfalls, wildlife preserves, deserts, mountains, oceans, seas, and many more too numerous to list.

You and your gifted child can learn to draw the symbols for different objects. It's fun to locate the symbols you know on maps. What can you tell about the land from the symbols? Why do symbols have such importance? How might symbols help a hiker backpacking in the wilds for a week or a month? How might symbols help you and your parent when traveling through one or more states on a vacation?

Make up your own map. Show a variety of symbols. Challenge each other to create a map, with the appropriate symbols, to correspond to some make-believe place: a jungle, a desert, a mountain community, a sea-side resort, or other. Show a population center. Show the necessary buildings to represent business. Perhaps farms or food growing areas need to be included. Show the water supply. If food is brought into or sent out of the community, show railroads and highways. Perhaps rivers offer the "water highways" to and from the region.

Three Dimensional Maps

Now make your flat map of the original neighborhood or community into a three dimensional one. Recall your walk through the area where you live to locate important buildings, parks, and other things. Now construct those buildings using paper, cardboard, wood, metal, wire, plastic, rubber or any other materials that are available. If you saw a fire station, construct a model fire station that looks as much like the real one as possible. It's not necessary to have a detailed model. If you wish, just show the shape of the station and don't add any windows, roof, doors, or other ornaments.

Trees can be made from pipe cleaners. Grass can be made by covering the butcher paper with green tissue paper. Watercolor or other paint will work just as well as tissue. Roads can be painted or made from black tissue.

Walk again into the area shown on your map. Carefully observe each building, park, tree, and other object. Decide whether your map at home really does look like the objects that you are viewing in person. Talk it over with your child.

An Aerial View

Remembering your techniques of photography, prepare to take an aerial view of your three-dimensional map. This is how maps are made: photographs are taken from airplanes. These photographs show certain landmarks: mountains, rivers, streams, lakes, dams, railroads, highways, and other significant objects. The photographs are used to make paper maps with the various colors, symbols, legend, compass, and other components.

Stand on a ladder, or something of sufficient height to focus your camera on the entire three dimensional map. Then take a few pictures of parts of the map: the recreational facilities, the business section, the outskirts, and others. Some maps feature special points of interest. These are shown outside the map in the margins. Other maps include a special point of interest (or two) on the actual surface of the main map area.

When you receive the developed pictures, you'll be able to observe that your map is flat; it's two dimensional. The photograph has flattened the buildings and other protruding objects. The special points of interest, which you photographed, are two dimemsional, too. But the photographs have detail to them; things are easier to recognize than they were on the flat map of your community or neighborhood. Notice if your streets are long enough and wide enough in relation to the rest of the objects on the map. Notice the other components of the map for accuracy.

Visit Topographical Models

First you and your child made a flat map, then a three-dimensional map. If you made a map showing the geography of the land area, you would have shown a topographical map or model. There was a time when your community had no buildings, parks, or other man-made features. It had only its mountains, flat lands, rivers, streams, lakes, or whatever else was there before man began building. From a very high altitude in an airplane or satellite, only the large physical features can been seen, even today.

Visit some displays of topographical maps and models. Here are places where you'll be likely to see them:

1. Observatories
2. Department of Water and Power Main Office Building
3. Colleges and Universities
4. City Hall
5. Hall of Records
6. Chamber of Commerce
7. Tourist Information Centers
8. Museums
9. Surveyors' Offices
10. Offices of Architects

Now that you've seen different topographical displays of your city, plan to make your own. You'll need a large piece of flat cardboard, some newspapers, starch, paint, some paper towels, and a sketch of your local geography. On the cardboard, sketch some of the geography on which your city or town is built. Include the surrounding mountains, desert, lakes, and other physical features. Ball up pieces of newspaper. Place these balls over the drawings of mountains and hills. Cover the balls with strips of newspaper dipped in starch (or a flour and water solution). For areas which are slightly elevated (low hills, slopes in the land, and plateaus), lay flat strips of newspaper, one on top of the other, to achieve the correct height. Be sure that each strip of newspaper is dripped in the starch.

Now apply small pieces of paper towel to the paper formations. Each piece of paper towel should be dipped in the starch. When the formations dry, paint them with the appropriate colors of paint. Lower elevations, as well as flat lands, too, should be painted.

You now have a map of the physical features of the city where you live. Buildings and other things may or may not be added to the map—depending on how much detail you wish to add. Generally, a map of this type stresses the geography.

Two alternative ideas for the map mentioned above are to use modeling clay or plaster of Paris. In the first case, the clay is formed and permitted to dry. It can be painted after it is dry and firm. Plaster of Paris can be poured over the newspaper formations, over cardboard forms, or over any type of material used for the structure.

Study the Kinds of Maps

There are many different kinds of maps. They are used for many different purposes. Some maps contain information about more than one subject. Most, however, have a compass, legend, title, special content, and other characteristics.

Here are some of the wide variety of maps which can be examined for a study of likenesses and differences:

1. Crops
2. Wildlife
3. Population Centers
4. Weather
5. National Parks
6. Countries
7. States
8. Counties
9. Raw Materials
10. Rivers
11. Mountain Ranges
12. Valleys
13. Races of People
14. Oceans
15. Camp Sites
16. Places of Interest
17. Airplane Routes
18. Railroad Lines
19. Steamship Lanes
20. Heavenly Bodies
21. Ancient Civilizations

Collect Travel Folders

An interesting and educational geography-related hobby is the collection of travel folders, pamphlets, and brochures. They are readily available in travel agencies, in bus depots, in train terminals, in airports, in tourist information centers, and in other locations. Many are free to those who request them through the mails.

Travel folders, pamphlets, and brochures contain colorful pictures and creatively-written information about different counties, states, and countries. Customs are explored as well as food, travel, history, monetary exchanges, time zones, and other exciting topics.

A collection of these free materials can lead to forming separate folders about cities, states, and countries of particular interest. The places of special interest can be followed in the newspapers, in the magazines, on television, on the radio, in the motion pictures, and through other means of communication.

Plan a Week-end Trip

You and your child can use the information you've obtained about interesting local attractions to plan an enjoyable weekend trip. Together the two of you can decide how far you can comfortably travel in that period of time. Other considerations are where you will stay overnight, what you will see, when you will see each attraction, which routes you will take, where you will eat, how much you will spend.

In preparation for the trip, letters can be written to the Chamber of Commerce, visitors' centers, and other sources of information. These materials can be read carefully and thoughtfully in preparation for the journey.

A map can be used to plot the route to be followed on the weekend trip. Sites of interest can be circled. Times can be inserted in these circles to indicate on which days and at which times each point of interest will be explored.

Following the journey, the plans can be reviewed to evaluate how well the planning went. Hints for planning future trips and other experiences can come from this first trip.

Longer Vacations

Longer vacations can be approached with the same care and planning that was used for the weekend trips. More information will be gathered in person, or through the mails, to furnish the maximum knowledge possible about the exciting places to be visited. Past experience with daily travel mileage, numbers of points of interest to be appropriately viewed each day, logistics of securing accommodations, and monetary demands can be used well in planning the longer type of vacation.

Records of travels can encourage the development of written language, mathematical skills, geographical concept-formation, understanding of cultural contributions and others. Well-expressed recordings about day-to-day experiences can challenge the individual to write succintly in an interesting manner. Records of monetary expenditures, average miles per gallon, average miles traveled daily, general cost per meal per person each day, admission fees, and other data encourage the development of mathematical interests. Geographical concepts come from observations and discussions about types of scenery, land formations, natural resources, and other related topics.

Contributions of different cultures come from the awareness of other people. You learn about their interests, manner of dress, architecture, means of earning money, kinds of reading preferences, preferences in the area of recreation, hopes, joys, and special aspirations. Museums, art galleries, historical monuments, cultural centers, and other places serve to broaden your knowledge about people other than yourself.

Stamp Collecting

A good source of information about other people and places is that received from collecting stamps. This is a hobby that can easily be done by both of you. Stamps are readily available at minimum or no expense. Two people, in fact, create more motivation to keep the hobby active than might be the case with only one collector. Stamps display information about historical events, foods, clothing, architecture, famous men and women, means of transportation, natural resources, language, occupations, medical breakthroughs, and other interesting bits of knowledge.

Almost everyone knows a family that receives correspondence from another country. The family is usually willing to share some of their stamps. Large companies tend to receive an influx of foreign stamps on their letters and are usually willing to give these stamps to stamp collectors.

Pen Pals

Another wonderful way to obtain information, stamps, coins, written materials, and other information about people and their customs is to correspond with someone in a foreign country. You and your child can jointly write to a student or family in another country. Together you can glean the joys of opening each letter, reading the interesting correspondence, and writing stimulating letters in return.

A pen pal is a ready source of information about an almost unlimited source of material. You can compare your country with your pen pal's. You can locate his or her country on a world map. You can learn the major rivers, cash crops, exports, imports, population centers, clothing, domestic animals, wild animals, occupations, college courses, political systems, serious diseases, forms of recreation, kinds of literature, and other broadening items of information.

In sharing many bits of information with your pen pal, it will be necessary to study and review many of your understandings about your own country. Many trips to the library to verify information will be necessary. Discussions with your friends might be needed to clarify concepts. You will learn much from the information that you supply to your pen pal.

Trace Your Heritage

It will be exciting to find out more about the country or countries from which your ancestors came. Perhaps as an adult, you will have much information already. If not you will want to write to other members of your family to glean facts. It might be necessary for your child and you to write to the countries from which your ancestors came to probe records and other types of information courses.

The public library will provide a source of information about the country's past history. More current, present information, can be obtained from the country's information centers.

Other Hobbies Which Stimulate Geography Study

Collecting hobbies which encourage your growth of knowledge about other countries and their peoples are the following:

1. Coins
2. Dolls
3. Books
4. Flags
5. Maps
6. Model Ships, Planes, Trains, Homes (building and collecting)

Long Range Growth With Geography

You and your child can continue to explore the mysterious world of geography with its interesting customs, curious physical features, and unique peoples. As with other subjects, geography offers some projects which will warrant your interest for a short period of time. Other studies will open one door after another. No one can learn all there is to know about the subject of geography. The important thing is that both your gifted child and you will be opening those exciting doors together and sharing the wonderful experiences as one.

CHAPTER III: A WORLD OF READING AND LANGUAGE

The Road To Reading

The road to reading never starts too early. Even before a baby appears to understand the purpose of books, the parent should read to him or her. The pleasant, soothing voice of the adult assists the youngster with the formation of language patterns. Children who are most often read to are the ones who experience the delight of books and adopt that thrill as part of their life style. Children who see their parents read books, assume that books must be good. Youngsters who observe their parents visiting the library on a regular basis begin to understand the purpose of that facility. Children imitate their parents in many ways. No greater form of imitation is possible than the child frequenting the community library, as well as the one in his own school.

A Wide Variety of Books

The parent and child can explore the variety of books available to be checked-out from the nearest library. Initially, it would be valuable for the parent and child to visit the library, together—even if the child is too young to read. It will be possible for the child to see the large collection of books, meet some of the library workers, see a library check-out machine, and observe his parent proceed through the checking-out process.

After arriving home, the parent can make a point of treating the books with excitement, mentioning how much he or she is looking forward to reading the book to the child that day. Even if only a short period of time is available each day, the parent should take this opportunity to share the reading material with the child.

As the book is read, colorful pictures can be pointed out; flowery passages can be read and re-read; exciting characters can be described in detail. You and the child can imagine parts of the story which are not explained.

Fairy Tales. . .The magical world of a thousand lands unfold through the wonderful tales of fairies.

Tall Tales. . .Hundreds of humorous stories have been written to entertain the reader. Some of the characters are rather ordinary, but their deeds are beyond comparison. Rivers are carved with a single swoop of a knife while cattle are tossed high enough into the sky to touch stars. The delight in this type of literature comes from its believably exaggerated nature.

Legends. . .This category offers the child stories about people who have accomplished wonderful deeds; individuals who have had unusual adventures; people who have become known for peculiar events. Many of the legends are as exciting the second and third times that they are read, as they were the first time.

Myths. . .Mythology contains thousands of years of stories which take into scope certain aspects of fairy tales, tall tales, and legends. Many of the stories take place in Greek settings and explain away the origin of the moon, the stars, mountainous formations, and other natural phenomena.

History. . .There is much excitement in reading about the history of our country. Many chapters in the growth and development of our United States are as packed with thrills as are any other kinds of literature.

Biography. . .It took many wonderful people to bring our world to its high state of civilization. Many unique individuals have made brilliant contributions to the fields of art, music, literature, science, mathematics, philosophy, and others. Their stories make exciting and interesting reading.

Social Studies. . .You and your child can share in the development of our political institutions. Read about the presidents, the habits and customs of people, business, industry, recreation, and other equally interesting topics.

Animals. ..Children thoroughly enjoy reading about the many different kinds of animals, their habits, their locations in various parts of the country, what they like to eat, and other aspects of their lives. Children are able to learn about the love that animals have for their young, instincts to protect, novel living conditions, and other cooperative efforts.

Sports. ..There is a wide span of sports from which to choose. All have been written about at one time or another. Some books help the youngster understand better the rules of the game. Other books tell the exciting lives of sports figures.

Mystery. . .A number of popular mystery series have been adapted to the children's level. Young people delight to the hair-raising adventures that are told in a cloak of patchy clues. Many opportunities are available to challenge the young mind to uncover the guilty party.

Picture Books. . .Young children in particular need many exciting pictures, combined with a sentance here and there. These artistic stimulants convey through pictures what words in other books communicate to the reader. Many a delightful dicussion can take place between the parent and the child about the actions and events of the pictures. Many children enjoy picture books so much that they memorize the words. The leaf through the book until the pages become separated from the book spine. Also, the young child can respond to the parent's reading by locating people, animals, and events as the story unfolds.

Fiction. . .Adventures, life-like stories, dramas, fables, myths, legends, and many more topics are covered by the non-true class of literature: fiction.

Science. . .From the space age to the tiny atom, science offers a broad range of fascinating stories. Popular-science interests of children are dinosaurs, sea monsters, insects, moon explorers, microbiology, machines, magnetism, backyard science, and related topics.

Poetry. . .Children love the rhythmic sound of short and long poems. Within the scope of this form of literature you'll find funny, sad and happy poems, poems about people, plants, animals, different people in different lands, foods, transportation, sports, and nearly every topic covered by other forms of writing.

Haiku. . .This oriental form of poetry can motivate many nature-related experiences through its emphasis on the events of plants, animals, seasons of the years, rain, snow, sunshine, fog, frost, mountains, steams, ponds, rivers, and others. The brief, meaningful composition of Haiku, along with its beautiful drawings and paintings, adds new dimensions to the enjoyment of literature.

Plays. . .Young people delight in the experiences of story characters. Many outstanding plays have been written to delight and entertain young people. They are available not only in hardbound books but also in magazines.

Share Stories Aloud

Even as your child grows older, the enjoyment gained from reading stories and poems aloud should not diminish. You and your child can select particular passages which each will read. Choral verse and dramatization of stories and poems provides a throughly enjoyable family experience. Children seldom get enough oral reading experiences. Only through practice with this skill can the voice quality and oral reading fluency develop. Like all skills, infrequent practice prevents maximum development. The use of a tape recorder is very worthwhile. The recording will point out to both of you the strengths and weaknesses of your oral efforts. Enthusiastic, sincere oral work can be a high point in your relationship with your child.

Puppet Shows

A good opportunity to use some of your newly-learned art skills is through the production of a puppet show. Many visits to the library will help your child and you to select an interesting legend, myth, tall tale, fairy tale, or other story. Much fun can result from sketching the story characters. Plans for the size of the puppet stage, stage decorations, stage properties, lighting, and other features, call for cooperative family decisions.

The two of you will make some simple puppets. Half of a rubber ball can provide a good head. Old rags or torn clothing can be used for the puppet costumes. Medium-strength string joined to crossed sticks will serve the puppeteer as the control device for the movement of the dolls.

A cardboard box, draped with cloth above and below the stage, will complete the major part of the project. Painted stage settings and miniature furniture serve well as the story settings.

Your practice with the tape recorder can come into play at this point. It is easier to pre-record the story for the puppet show, than to attempt to do this during the performance. Also, a radio or record player can be used as background music during the actual advance recording of the event. Different kinds of music can be recorded in the background to emphasize happy, sad, frightening, and other appropriate emotions to be portrayed.

Now, you and your child are ready to invite some of the neighborhood children to view the show. You might even go so far as to paint posters to advertise the performances. This opportunity to entertain others through your creative efforts will go far to build self-confidence in your child.

Stick Puppet Show

Even more simple to prepare and present than a puppet show is a stick puppet show. Once again, select a story or poem that is of mutual enjoyment to both of you. Tape record the story with each of you sharing the parts and appropriate background music. In place of a puppet stage, use a carboard box cut out in such a way as to leave only the bottom, top, and sides. The front and rear should be cut away. Now cover the front part of the box with a white piece of cloth. Focus a 100 watt bulb on the rear of the stage.

Cut a slot several inches wide in both sides of your stage to permit the stick puppets to be inserted and removed. Attach all of your characters, trees, mountains, houses, and other objects to individual sticks. Be sure that the stick on each object is connected to the side so that movement back and forth is assured. Also, be certain that the stick on each object is long enough to allow the object or character to move as far across the stage as is necessary.

With your wonderful stage and creative objects, the stick puppet play will surely be a big success. Add to this the exciting tape recording, with a musical background, and the "show must go on!"

As with the other puppet shows, it is more enjoyable and rewarding to share the experience with others. Don't hesitate to draw motivating posters to interest the neighborhood children and their parents in attending the show. Perhaps some of them will want to help manipulate the stick objects, too.

Miniature Design of Stage

Stimulating books can motivate you and your child to design and construct a miniature stage. Plays in particular, are staged in special theaters. What is needed on the stage itself? How is the scenery changed so quickly? Where are the spotlights? How do they shift to stage locations? How are colored lights projected onto the stage? Who moves the properties from location to location? Where are the costumes stored? Where are the large properties stored when they are not in use? From where do the actors enter to start the play; during the play; after the play is over and curtain calls are in progress? How is music provided for the actors? How are sound effects created? Who gives performers their cues if they forget their lines?

A miniature stage can be constructed out of wood, cardboard, metal foil, clay, pieces of plastic, and other common materials. Research in the library will provide the two of you with sketches of stages. The base for the stage can be a box turned upside down. Sides, a rear, and a ceiling can be created using cardboard. Backdrops can be cut from cloth. Curtains can be cut from colored fabric and pleated. Drawstrings can be sewed into the seams, along the edges. Spotlights can be hung by wire or string from rafters which extend out from the top of the stage.

Now furnish your miniature stage with miniature properties: chairs, couches, lamps, tables, pictures, desks, coffee tables, beds, and whatever items are called for in the story.

Dress the characters in costumes which are appropriate for the time period in which the story takes place. Show the difference, in size, between adults and children. Show the differences in ages between young adults, and older characters.

Attempt to find musical selections which fit in with the play and its events: fast music for exciting parts of the play; slow music for serious, thoughtful events; elusive music for mysterious parts of the play.

Vary the stage with the selection of different kinds of stories: animal, tall tales, legends, myths, fairy tales, history, biographies and others.

Original Illustrations

Draw pictures to illustrate your favorite books. Try to make the pictures or charts colorful and exciting. Attract the attention of the viewer. Show parts of the book in such a way that others will want to read the book, too. Use different types of media: water colors, tempera paint, poster paint, tissue and starch, charcoal, construction paper, and others.

Book Jackets

Cut a sheet of paper into a book jacket. Measure an average size book. Fold the sheet of paper so that two or three inches will overlap the book covers (on each end of the book). If you have excess paper, trim it away from the book flaps.

Now design an original book jacket (dust cover). Use your imagination: make it exciting; show some humorous parts; indicate the season of the year when the story takes place; show some of the characters doing exciting things.

Design a book jacket to stress just exciting events in the book. Design another emphasizing only the characters. You and your child can think of themes other than the ones mentioned above. See how creative and original you can be. See what good salespersons you can be.

Group Performance

Beside the two of you, what other members of the family could help dramatize one of your favorite stories? Encourage them to participate in this fun activity. How can the members of your family (or friends) take part with you in dramatizing the book? Well, perhaps you'll want to select part of the book: a funny episode; some dramatic moment; a sad event; a confusing part. Perhaps you'll decide to show a series of episodes which occur throughout the story.

It will add to the fun of the experience if the characters dress for the presentation. Simple costumes can be made out of paper. Maybe some old clothing is stored away in your home; it can add just that right touch to the portrayal of one of the characters.

Have a few rehearsals. Tape record some of them so that everyone can review his performance. It might add to the enjoyment of the presentation even more by recording some background music to play during the dramatization.

Hook up a spotlight: a goose neck lamp, using a 100-watt bulb (or larger wattage if possible) will do nicely. An old sheet can be used to represent the stage curtain. A large sheet of butcher paper can be decorated for background scenery. Some properties might be added to the room to make the scene even more realistic: chairs, lamps, a couch, and other needs.

Applying the Knowledge from the Book

Suppose your gifted child reads a book about the early history of the Colonial United States and wants to apply some of the learnings. What practical projects could the two of you pursue? How can you construct a log cabin? Think about the source of lumber in those days. Did the settlers visit a local lumber yard? Where did they acquire the wood? How were the logs fitted together? What secured them? What furnishings were typical of the log cabin? What sources of energy were used? Where was water obtained? Where was furniture acquired?

Another project might be to construct a wagon or cart from that period of history. A quill pen is yet another pratical experience. You can actually use the pen to write notes and letters.

Discuss Your Likes and Dislikes

You and your child can enhance your opportunities to communicate with each other through many brief discussions about books. Like other things, there are books which have interesting content. There are also books which fail to gain the attention and interest of some individuals. Naturally, tastes will vary, but most people find books in both categories.

Discuss the pros and cons of certain publications. Support your statements with information you remember from reading the book. This is a very excellent technique to understand the concept of opinion versus fact. It will also afford the individual opportunities to compliment as well as criticize.

Tape record some of your discussions. Analyze them later to determine whether you maintain those same opinions.

Illustrated Talk

Prepare a brief talk about one of the books that the two of you enjoyed. Add to the interest of the presentation by showing pictures or diagrams about the book. Tell about one or more of the characters. Tell what you think others would like about it. Mention other popular books that the author has written.

Character Description

Describe one character in detail. Tell what mental pictures you saw as the story progressed: Was the person young or old? Was he or she kind or inconsiderate? What major things are accomplished in the story? What lesser things? What were the person's likes and dislikes? Do you know anyone like the character you selected? How did he or she dress? How many friends do you think the character would have? Would you like or dislike the person? What actions were similar to those you would likely take? In what kind of house or apartment did the character live? Was the residence in a large city or small town? What did he or she do for a living? If the person liked his or her job, what other occupations would be acceptable some day? If he or she lived at home and attended school, what were the character's favorite subjects? What sports were favorites? Where would this person like to travel? What did no person know about him or her that the book revealed?

When you give information about the character that comes directly from the pages of the book, indicate this. When the ideas come from your imagination, in terms of what you think the character would do, indicate that this is your opinion.

Answer questions about your character description. Act as an expert on the subject of your character. This position can lead to many interesting side discussions. Be open minded, though; others might have read the story and developed different ideas about your character. Some people might get different ideas just by hearing you discuss other points about the featured character. Only the author of the book knows for sure what he or she intended the character to be like. It would be interesting to write to the book's author and compare your impressions (and those of your friends) with the author.

Pantomime Parts of the Story

Those stories (or parts of stories) that you dramatized were performed with words and actions. Pantomime is done without the use of words. Your body actions and facial expressions are your only tools to convey your thoughts to the minds of the viewers.

Select an interesting episode from a book. Plan how you'll present the section's meaning to your audience. What motions will your body make? How long will those actions last? In what order will they be presented? Which will be gentle? Which will be greatly exaggerated?

What facial expressions will you use? What emotions will be expressed: Fear? Joy? Sadness? Indecision? Certainty? Regret? Practice in front of a mirror to perfect your performance.

Observe your audience very carefully to see if they react to your dramatization the way you intend them to react. It might be necessary to practice again, until that time when your body actions and facial expressions represent what you intend them to portray.

Use Information to Start a Collection

Books have a natural tendency to excite. This excitement might take the form of reading more books about the same topic. Some books motivate you to experiment. Others encourage you to start a collection of some sort. For example, if you read a book about birds' nests, you might want to collect old nests that are no longer needed by the bird family. The nests might be carefully placed in cardboard or wooden boxes, covered with transparent wrap (acetate, glass, or other see-through material), labeled with related information, and displayed neatly in your room or other part of the house.

Space books can stimulate you to cut pictures out of already-used magazines which show and tell about the moon, the stars, satellites, comets, other planets, the sun, meteors, meteorites, and other space phenomena.

Histories might motivate you to begin a scrapbook stressing different manners of dress throughout the years. Perhaps you'll also want to include significant events that occurred during the times shown by the costumes.

Books about transportation might stimulate you to collect models of old trains, planes, boats, cars, streetcars, bicycles, motorcycles, and others.

Mineral books can stimulate a collection of rocks. These can be displayed in cardboard boxes much like the example about birds' nests, on inexpensive cotton, labeled with pertinent information about the rock, and located so as to be observed and enjoyed again and again.

Make a Time Line

History, in particular, lends itself to the drawing of time lines. The various happenings during certain decades and centuries can be placed on a time line drawn on a long strip of butcher paper along with a colorful drawing or illustration. Many features of history can be incorporated on the line, within a very limited amount of space. A foot can encompass four or five centuries. Food, clothing, shelter, occupations, trades, crops, natural resources, means of transportation, classes of people, and other topics can be observed on the time line.

A comparative time line can show events—one under another. For example, events in music can be shown under happenings in medicine. The development of art can come under medicine. It is not difficult to display five or more parallel developments on the same line.

Broadcast a Book Report

A fun activity in regard to enjoyable books is a radio or television broadcast. As with the dramatization discussed earlier, radio and television productions can add a theatrical quality to your books. For a few minutes, you can be the station's leading book critic presenting your views on a book that you have just finished. The audience hangs on every provocative word that comes from your experienced literary background.

The type of book presentation challenges you to be fluent, logical, and exciting. The experience is a wonderful one in the area of communication. As an expert, you needn't prove every statement; it's understood that you are widely read and are giving your opinions about the book. People can accept them or reject them, but you're a person to whom they listen.

Dress As a Character

Another version of the dramatization, in dress, is the one where the child selects a character from a favorite book for narration purposes. First, the individual dresses as much like the book's character as possible. Then, a complete synopsis of the book is presented: the beginning; list of characters; location or locations where the story takes place; time of year; interesting occurrences; particular role in the story; specific relationship with other characters; particular likes and dislikes; and other appropriate topics or items.

Again, the character-in-dress can serve as an authority on the book. He or she can answer questions from the audience about nearly any part of the book. The "character" will probably want to point out to the audience, however, as questions are answered, that opinions expressed are his or her own.

This type of report lends itself to selling the book. The character can encourage the audience to read the book, too. To accomplish this end better, colored illustrations taken from the characters or events in the book can be presented to the viewers.

Book Bulletin Board

Schools traditionally use bulletin boards to motivate students. Some of the purposes for which they are used include the following: to encourage youngsters to read books; to provide information about some subject area; to intrigue the student to solve a problem; to beautify the room; to review prior learnings; to motivate the class for a future field trip, class visitor, health or safety campaign, auditorium presentation or social studies unit; to provide information about classroom schedules or routines.

Why not have your youngster utilize a small bulletin board in his or her room as motivation in the area of reading? All the project will involve monetarily is the purchase of a medium-size piece of corkboard. Border the cork with a narrow wooden frame and attach it to a wall, door, or sliding cupboard with adequate clearance.

You and your child can plan the purchase of the bulletin board, its location and placement. The shopping trip can incorporate some of your earlier art experiences dealing with color schemes. This will avoid the corkboard clashing with the room's color patterns. Comparative shopping to insure the best purchase at the best price is good consumer education.

As the child reads new books, he or she can decorate book jackets to display on the board. Colorful painting, illustrations, and other art work can be nicely displayed, too. The child will want to stress, in the art work, exciting events in the book, favorite characters, enjoyable locations, pets, hobbies of the characters, recreation, and others.

The bulletin board can also contain a record of the books that the child has read during a two-week period, month, or other period of time. In fact, a miniature book jacket can be displayed for each of the books that the child has read. It will be observable, at a glance, what are the youngster's reading tastes. This record can give the parent good ideas about books to purchase for birthdays and other occasions. There might be times, however, when you will want to encourage your child to sample other areas of reading, if for example, all of his or her reading selections are in the area of tall tales. Together, on one of your regular trips to the local library, you can discuss which shelves your child has been going to for books, most often. This can lead to the exploration of other shelves. Done this way, without criticism, your child's vistas can be broadened.

Your child can use the board to stimulate other members of the family to respond. For example, there might be some questions about a person or animal, place or thing. Just enough information can be given to pique the viewer's curiosity. Perhaps more and more clues can be added to the board daily or weekly. Possibly a group of names can be pinned to the opposite side of the board as feasible correct answers. The mystery can go on and on until someone verifies the right answer. Note the word "verify"—part of the intelligent approach, here, is to stimulate sound research, not random guessing. In the same way, hints about current magazine articles, poems, puzzles, and other items can be motivated, too.

Carvings of Book Characters

Such materials as soap, wood, vermiculite, and clay can be carved into fascinating objects with relative ease. The only tools necessary are the same ones you used for your plaster of Paris sculptures: a butter knife, a fork, sandpaper, a paper clip, a pin, and other common items.

For soap carving of a favorite book character, animal, or object, a pencil outline should be traced on the bar. Clearly show which parts will be carved away and which will remain. Carve away gradually; it's easier to save a project when a little has accidentally been removed, rather than a lot. If the soap is layered, carve with the grain. Eyes, nose, mouth, ears, and other body parts can be added to the item with jeweled straight pins, small construction paper circles, pieces of brightly colored felt or tissue paper. Finish the project by sanding it smooth. Use fine grade sandpaper to preserve the true shape and design of the object. Coarse sandpaper has a tendency to scratch the soft soap surface.

Wood carving requires special tools. Generally, they can be purchased for several dollars. You and your child can have fun exploring the function of each tool. The grain of the wood will be most important in achieving success with the carving. If you work against the grain of the wood, damage will be done to the material. Work with the grain. As with the soap, finish the project with fine sandpaper. Unlike soap, however, the wood can be painted, sprayed with clear plastic or varnished to a high finish. You might also want to mount the carving on a wood or metal base.

Vermiculite is mixed with plaster of Paris to form a solid-appearing form. It can be poured before it hardens into a n empty milk carton. When dry, it can be carved easily with the same tools as you used for the soap project. Paper or a plastic sheet should be placed under the vermiculite block because of the amount of flaking and crumbling that takes place during the carving process. The finished project can be made completely smooth with the aid of fine sandpaper. This medium, too, can be mounted on a base to add to its appearance.

The soap, wood, or vermiculite carvings can be displayed near the child's bulletin board or in some important prominent location in the house. An illustration can accompany the object to more fully explain its significance. Groups of carvings, representing characters and objects from one or more stories, can be meaningfully displayed together.

Book Dioramas

Many museums have displays of historical events, scientific phenomena, and other topics in natural settings.

You and your child can depict favorite books and stories in much the same manner. You'll need an empty cardboard carton—the typical size available in market bins. Place the carton on your table so the end with the lip faces you. Remove the lip. Now, keeping in mind a book theme, plan to decorate the interior of the box to reflect that theme. For example, if your theme deals with ***Robin Hood***, you'll probably want to show the woods in the background (or the rear part of the box). Tissue paper and starch works nicely for this effect. Pipe cleaners covered with brown tissue, and topped by green tissue balls, can serve as your trees. The sky can be developed with

colored chalk; crayons; or water colors. The foreground requires your center of interest. Characters can be carved from some of the materials mentioned before. The most expedient way to form the characters is with the medium of clay. Later, you'll want to dress these figures with cloth or tissue paper. The sides of the box can be covered with tissue paper and starch. With the diorama, birds can be hung from the inside top of the box (or from the sides). The moon, stars, planets, airplanes, rockets, fairies, and other suspended objects can be hung in the same manner to provide exciting effects.

Book Panoramas

Unlike the dioramas, panoramas can be displayed in the open. A table top, large piece of flat cardboard, sheet of plastic, sheet of wood or other large surface area serve the panorama idea well.

On this large surface, place some material to represent the ground floor or other setting. An interesting ground effect can be achieved by gluing sand or soil to the surface. Hills or mountains can be constructed with the balled paper and starch technique mentioned in conjunction with the map section. Clay, plastic, soap, vermiculite, wood, and other materials serve their respective purposes for characters, animals, and other objects. Cardboard can be used freely for the construction of buildings and other objects.

Once painted, the panorama can truly be a work of art. Plastic people and animals, produced commercially, can be used in this art project. Not every item displayed need be made by hand. In fact, to represent a lake or pond, a pocket mirror can be imbedded into the sand or soil ground to achieve the desired effect.

As with the other projects you and your child do together, the important thing is that the two of you enjoy the opportunity to share the experience. Much communication will take place. The adult will have to overcome the tendency to draw upon his or her background for every decision or how it should be done. It doesn't have to be perfect—learning comes from failure as well as success. Planning to do a better job the next time is certainly valuable.

Dressing Dolls as Characters

Girls in particular enjoy playing with dolls. Most of the time, however, the dolls and dresses are purchased. Why not make dolls and also make their clothes? Many appealing book characters lend themselves to construction and dressing. Not only a doll, but a group of dolls can be undertaken. Spare pieces of fabrics around the house can be made into beautiful costumes for the dolls. Your child will be involved in measurement, the skill of sewing, the art of color combining, pattern making, and other worthwhile activities. Boys, too, enjoy handicrafts. They certainly won't object to assisting with the construction of the dolls and even sewing costumes, particularly for the males.

Cartooning

The child's creative talents can be put to use in yet another way: through cartooning. Pictures can be drawn of story scenes, favorite characters, and other book parts.

Some cartoons will contain only the actual pictures. Others will be accompanied by captions. Some will be single cartoons while others will be made up of series or strips of individual cartoons.

The two of you can plan the sequence of events in the cartoon strip. The contents of each box can be studied carefully. How many characters will there be? What will the emphasis be? What else will be in that box? What will the foregound show? What will the background display? How can each box lead naturally and interestingly to the next box? What medium will you use for the project: crayon, paint, colored chalk, charcoal, or another? How large will each box be? What will the cartoon use for its medium: art, paper, plain newsprint, tagboard, plain tissue, cardboard, or another?

Evaluate the finished product together. Are the cartoons really humorous? Do they show animation? Are the boxes connected in thought? Will others be motivated to read the book? Are any of the important parts of the book left out?

Acetate and felt tip pens can be used to make overhead projector transparencies from your cartoons. A long strip of acetate, even the plastic-like materials used by meat markets to cover meat, can be used to make a filmstrip. Each frame of the strip would accommodate one of your cartoon boxes nicely. Color the cartoon components with the felt tip pens which come in many bright colors.

Using some of your photography techniques, photograph each box of your cartoon. Pin each in the proper sequence on your bulletin board.

Blackboard Book Talk

To encourage oral communication and art skills, the two of you can plan a talk at a portable blackboard about some of your favorite books. It is not easy to discuss a topic and quickly sketch ideas on a nearby board. In teaching, salesmanship, and many other settings, the skill is essential. What better time than now when your child is young can the skill be taught, encouraged, and practiced?

To start, perhaps only one diagram will be used in the book discussion. As the skill with this technique improves, more and more diagrams and illustrations can be employed. Colored chalk can be used to add clarity to complicated drawings. Parts can be labeled. Arrows can be drawn to drawings. Many more techniques can be used; they will develop naturally.

A tape recorder should be used, periodically, to evaluate the presentations. At other times, the talks can be pre-recorded and during the playing of the tape, the presenting individual can draw and illustrate related materials on the blackboard.

It is important with this, as well as the other projects, that the parent participates equally. Some of the skills required, perhaps are not your strengths. Neither are they strengths of your child, but going through the learning process together is rewarding. On the other hand, if you're quite skilled in these areas, your child can use you as a model, just as you use others who you consider important for model behavior. When a child sees that a parent is enthusiastic and interested in something that validates it for the child as being something really worthwhile. Children naturally admire and respect their parents. Whatever occurs later to change those impressions for the worse, are not usually the results of compassionate, interest, and sincere parents.

Book Murals

A large sheet of butcher paper and some art medium or media are all that you need for a book mural. The sheet of paper can be hung on a wall when complete, but it is more convenient to complete the work on the mural on a table top or even on the floor. There are many ways to proceed. Usually, you'll want to plan the parts of the picture, allowing adequate room for each major portion of the work. Rough charcoal sketches can be drawn on 8½ x 11 inch sheets of paper. When perfected, the sketches can be turned over against the butcher paper and rubbed. This will transfer the rough sketch onto the mural paper. Another approach is to use chalk to sketch the rough figures and objects, the sketches can be carefully gone over with paint or the other medium to be used.

It adds a lot of interest to murals to mix the media. Fabric gives a depth to the work. Pipe cleaners can be glued onto shapes and figures. Thread can be used to suspend birds and other items.

This project gives you and your child many opportunities to make decisons about foreground, background, centers of interest, color use, perspective, shading, texture, and many other art elements.

Wordless Story Synopsis

This technique employs the use of pictures to depict a favorite book or story idea. A strip of pictures, showing the events of the printed material, can be arranged in sequence. Each picture can represent a chapter, a major occurence, a story character, or a season of the year during which the story episodes take place or other significant topics.

The pictures can be developed using any type of art medium. The figures can be realistic or cartoon-like. They can be produced on art paper to have a two-dimensional effect. Developed on acetate as filmstrips or overhead transparencies, the wordless stories take on a more three-dimensional appearance.

New Ending

A creative idea is for you and your child to make up a new ending to a favorite story of yours. The ending can be humorous, serious, imaginative or even poetic. The addition to the story can be brief or long. Characters can be modified; settings can be altered; relationships between characters can be changed.

Perhaps you and your child will want to make up as many creative endings as possible and then select the one or two best ones from among the list.

A good exercise in creative endings is to have the least likely character make some significant contribution to the story. For example, one of the minor characters might become rich, find a treasure, invent some famous time-saving device, enter a career as a movie star, start a club, or have another good fortune.

New Adventure

Add an exciting chapter to your book or thrilling episode to your favorite story. Place this addition anywhere, at the beginning, near the middle or at the end. Have the story take a sudden turn. Add mystery; create a tall tale;

include faries; insert a legend. There are many, many possibilities. See how adventuresome you can really be!

Listen to Book Reviews

Check your local radio program schedule to locate book reviews. These informal chats between the interviewer and the author add a new dimension to your knowledge of how books are researched, developed, and finally written. A wide variety of topics are discussed on review programs. The two of you can take notes regarding the questions asked by the interviewer and the answers given by the author. Classify these questions and answers into categories: questions about the author's early life; questions about the author's formal literary training; inquiries about the author's family and friends; questions about the author's style of writing, work schedule, and techniques; questions about future trips, writings, or other undertakings.

Evaluate the interviewer. What did he ask about the author's current book? Were the questions thought-provoking? Were the questions indicative of a person who has a deep understanding of literature? Were any of the questions off the topic? Were any of the questions embarrassing? Did the interviewer display a sense of humor? Was the interviewer able to connect several interesting questions together? Were the questions free and flowing?

You and your child can interview each other. One person should pretend to be the author of an important book. The other person can pretend to be the interviewer. See how well the discussion can go. Avoid gaps in the conversation. Make the dialogue interesting.

Visit a Bookstore

Become acquainted with bookstores. Where are books sold? Where can the largest selection be found? How many bookstores are there on the main street of your town or a busy shopping center in your town or city? How are books arranged? What guides are there to help you locate books in a hurry? What advertisements are used in the bookstore? In the windows? In the store area? On the counters? On the actual shelves? On displays?

What are the prices of certain types of books? Can you locate a book about gardening? Is there a collection of books about cooking? Locate some books about making home repairs. Find books about sports. Are there books about areas of science?

Study book jackets. What makes some of them more interesting than others? Which colors are used? Do most of the jackets have designs or solid colors? How many of them have pictures of people, animals, or other things?

What are the different book sizes? Which books are the largest? Which are the smallest? Which are the thickest? Which are the thinnest?

How is a bookstore like a library? How is a bookstore unlike a library? Which has more books? Which has more new books? Which has more shelves? Which has more adult employees?

A Book Tree

A motivational book idea is to have a book tree in your child's room or elsewhere in the home. A piece of drift wood, a series of small branches, or clustered twigs all serve well as the body of the tree. Whichever one you use, fix its base in clay or plaster of Paris so that the tree part stands upright.

Tie a piece of thin string to each branch tip. Add a paperclip to the end of each piece of string. Now, after your child completes each book, have him or her design a minature book jacket. Attach each book jacket to one of the paperclips.

Watch the tree grow a crown of book jackets. The active reader will not have a bare tree for long! Like the seasons, the tree sheds its leaves from time to time only to be replaced by a fresh growth of book jackets.

File Box

You and your child can have fun keeping a book record in a metal file box. Decorate your file with titles of books, pictures of characters, minature book jackets or other motivational ideas.

On cards suitable to fit into your file box, write a brief summary of each book that is read. Place the cards in alphabetical order behind the correct index letter.

Cards may also be kept alphabetically by topic. This idea allows a rapid look at the kind of reading preferences that the individual has. It can be a stimulation to broaden the person's reading diet. From time to time, it is fun to review the many different cards in the collection.

Map of Book Travels

Through books, you will travel to many lands. Within the United States, hundreds of cities and towns can be visited. A very interesting way to recollect these journeys is through the use of a wall map. Place a pin or other marker on the map for each visit that you make via reading to another town, city, state, or country. A piece of paper like a flag can be glued to the end of the marker. On the flag, record the name of the book which brought you to this spot.

Before too very long, both of you will become widely-traveled individuals. You'll want to test your memory, from time to time, to see how much you both remember about each visit.

Book Characters in Full Scale

With several large boxes for the body, tubes of rolled newspaper for the limbs, a smaller box for the head, and string; you and your child will construct one of your favorite storybook characters. Tie the parts together tightly. Now cover the form with strips of starch-covered newspaper. Finally, paint the structure with several coats, if necessary.

Yarn cut to look like hair, marbles for the eyes, and cut-out ears will complete the life-like character. Clothing can be formed from construction paper, tissue paper, or old rags.

Each figure will stimulate your memory about the wonderful story from which he or she came. Perhaps you'll want to read more stories like this one. Maybe the author even wrote a series of related adventures—some with this same exciting character.

Hanging Mobiles

The chapter about art gave some ideas for mobiles. Books offer many more. Mobiles can be constructed using the themes of storybook characters, story events, seasons, histories, scientific inventions, and many more ideas.

Change the mobiles from time to time. They can vary with the topics of books that you are reading or the seasons of the year. They can be changed for famous holidays. They can center around seasonal sports. Others can change with the stars which are visible in the sky at different times of the year. Others can feature Presidents of the United States, states of the union, cities, flowers, trees, animals, rocks, airplanes, boats, trains, and other subjects.

Bookmarks

Almost any firm piece of material two inches by eleven inches can be made into an attractive bookmark. Some marks can be eight or nine inches long. Cut the appropriate piece of material into the desirable size. Decorate it with some type of item which will not come off on the pages of your books. A woodburning instrument used under the supervision of a parent can be used to make many interesting designs. Some permanent inks can also be used.

Tiny wooden animal heads can be glued to the top of your bookmark. Yarn tails are sometimes attached at the bottom. See how creative each of you can be in making your bookmark.

Language-Related Book Ideas

There are many activities which can be done by your child and you to further the skills of written language as they relate to reading. As before, some of these activities will be short-lived; others will continue for an extended period of time. You'll probably want to approach a limited number of those listed. A few projects done thoroughly will produce more value than touching all of them in a scattergun approach.

It is not essential that the parent be well-versed in each activity. Both the parent and child will grow through the research, investigation and experimentation necessary to accomplish the various topics. Patience and understanding in the common sharing of each project attempted will go far to produce the desired results. Learning comes from failure as well as it does from success. By the vary nature of each suggestion in this chapter, success is insured to varying degrees.

Another Library Visit

While this will not be your first visit to the local library, it will open new doors. A review of prior learnings is possible along with new activities.

1. Parts of the Book—cover and spine, title page, copyright date, publication or printing date, dedication, acknowledgments, foreword, preface, introduction, table of contents, list of illustrations and maps, body of the book, bibliography, appendix, glossary, index, note about the author, and other parts

2. Arrangement of Books—left-to-right placement on shelves, Dewey Decimal Classification, classification number, arrangement of fiction, arrangement of non-fiction, and other details

3. The Card Catalog—alphabetical order, abbreviated words in book titles, names beginning with "Mc", numerals in titles, author cards, title cards, subject cards, illustrator cards, series cards, Newbery and Caldecott Medal Cards, cross-reference cards, guide cards, and variations
4. Reference Collection—encyclopedias, atlases, unabridged dictionaries, almanacs, and other reference materials
5. Glossary of Library Terms

An Autobiography with Photographs

You and your child can write autobiographies about very important people: yourselves. Naturally, all autobiographies are written by people about themselves. Other people write true stories about other individuals; these are called biographies. In the autobiography, place as much information as possible about different periods of time in each of your lives. To help make the work more interesting and accurate, include photographs of yourself and others. Add variety to your writings. Include subjects such as place of birth, schools attended, travels, hobbies, special likes and dislikes, jobs held, family responsibilities, pets and other interesting things.

A Diary

Record the events of daily life, or less often, in a commercial diary or in a tablet of your own choosing. Organize your summaries into brief, interesting anecdotes. Include the books which you are reading and have read in the record. Involve your finest language skills in writing the document.

Creative Writing

Write short stories about some of the topics you've explored through your readings; histories, biographies, legends, tall tales, fairy tales, myths, poems, Haiku, and additional ones.

Develop interesting beginnings. Connect the stories from beginning to end with easy, flowing material.

Outline-Talk

Prepare a talk about one of your favorite hobbies. List some brief information at which you will glance during the report. Find some related pictures in magazines to make the talk more meaningful or draw some pictures if you can't find the appropriate materials. Now give the talk to one of your family members. Remember to look at your audience as much as possible. Use hand and arm jestures to emphasize important points. Vary your voice tone to add interest. Give the audience things to think about from time to time.

News Report

Read an article in a children's magazine which deals with a news item. Write down information about the article which tells who, what, where, when, why, and how. While you might not be able to answer all of these questions, the more you can answer, the more knowledge you'll have about the article.

Book Page Puzzle

Take a damaged book that is not complete. Cut out one page and back it with a piece of cardboard the size of the book page. Now draw a design on the piece of cardboard. Be sure that the design covers the entire piece of cardboard. Now cut out the design, following the lines. Turn the pieces over and before you is a page in many different shaped pieces. Assemble the puzzle so that the page is complete again. You can repeat this process with pictures. The more complicated the picture or page, the more difficult it will be to assemble it.

Story Monologue

Write a story about one person's adventures, thoughts, and other activities. Only write the comments that the one person says or thinks. Try to make the story interesting. The person can have many exciting adventures. He can see mysterious things. He can take part in humorous activities.

Movie Script

There are a lot of details in a movie script. Each character has lines to say, except for the rare persons who say nothing. There are often bits of information about the person's clothing, mannerisms, and favorite locations at home or work. Information about sound effects and scenery are often included, too.

Make your movie script exciting. Include as many characters as you can handle effectively. Keep the story moving smoothly.

Movie on Rollers

Use a long piece of butcher paper or 8½" by 11" pieces of plain paper glued together, side to side. On each piece of paper, or in each box which you'll draw on the butcher paper, draw a picture. Under each picture write a sentence or two about the picture. Glue each end of the long strip to a stick 12-14" long. Cut the center out of a box which is wide enough and long enough to house the entire strip. As you turn the strip from left to right, each picture will be visible through the hole in the box lid. This will be just like looking at a television set. Be sure that not only the pictures are easily seen through the cut-out part of the box, but also that the words beneath the pictures can easily be read.

To add even more beauty to your television movie, decorate the box with contact paper, tissue, construction paper or other materials. Make a wire antenna and fix it to the top of the box. Now it looks like a real television set!

Write New Endings

Write a new ending to a favorite story or book of yours. Add a new twist to the plot. Include mystery, humor, joy or other emotions. Add characters; take away characters. Locate the story in a new, far away land.

Now write more surprise endings to stories and books. See how original you can be. Vary your style. Be creative.

List of Unusual Words

Buy a tablet or package of 3" x 5" index cards. List unusual words that you come across. Be certain that you look up the part of speech, meaning, and correct pronunciation of each. Put the words, part of speech, and pronunciation on the front side of the card. Write the meaning on the reverse side. Go through the words, looking only at the front of each card. How many of these words can you define? Now reverse your package of cards. How many of the meanings give you a clue about the words on the front?

Place your cards behind the correct letters in the index. Take out cards from behind the letter "A". How many of these words do you know well? Become well acquainted with the cards behind each letter. Be sure that you add new cards to your file every week or more often, if possible.

Lists of Descriptive Words

Write down as many descriptive words as you can. Add to this list as you read more and more; you will come across many other descriptive words.

Letter of Commendation

Write a letter which commends a book for its interest and excellence. Pretend that you are writing this letter to a very important person. Mention why you like the book so much.

Now mail the letter to some important person: your mother, father, guardian, brother or sister, aunt or uncle, a grandparent, a cousin, or other family member.

Synopsis

Write an original synopsis about a book or story that you have read recently. Be factual. Give your honest opinions about the strong and weak parts of the story or book. Include other important points of information.

Write To an Author

Compose a letter to your favorite author. Ask five good questions about the person's writing life. Mention what you enjoy about the author's style. List some of the books, written by the author that you have read recently. Ask the person questions that you might have about one or more of his books.

Comparison of Books

Compare two or three books. They needn't be books about the same topic or by the same author. List the things that are alike in the books. Compare the style, content, number of characters, settings, use of descriptive words, amounts of humorous material, and other points. List the things that are different. Select your favorite, second favorite, and third favorite book. Be able to support your choices with good reasons. Your favorite book should have the most strong points. Your second favorite book should have the next largest number of good points. Your third favorite book should have the least number of good points.

Make a Reference Book

Refer to some of the the reference books mentioned earlier in this chapter. Research one topic. For example, you might wish to gather a lot of information about elephants. Whichever subject or topic that you choose should be recorded in your reference book. Include information about all aspects of the thing you choose. If you should choose elephants, you might include such things as food preferences, where they are found, how they move about, the different species, how many travel together, the usual coloration, and other details.

It will add interest to your reference material if you include pictures and drawings. A table of contents will make information easier to locate.

You might wish to include maps and other graphic materials. Whatever you do include, be absolutely certain that the information is true and accurate. A reference book is thought of as a true source of information.

Headline and Title Writing

Write 10 headlines for exciting make-believe news stories. They can be about any topic that you choose. Try to interest the reader with your information. Give key ideas; don't give away the entire story in your brief headline.

Make up 10 book titles about your favorite subjects. Catch the attention and interest of the imaginary reader with your clever and catchy titles.

Books About Your Favorite Authors

Find out more about one of your favorite authors. How long has the person written books? Are the books all on one topic? What background information do you have about this author? Which is the author's most satisfying written work of all he or she has written? Why?

After you have collected enough information, form a small booklet about the person. Attach a colorful cover and decorate it with episodes and characters from the person's works. Perhaps you'll even want to write some book or story titles on the cover of the booklet. This is a good way to stimulate interest.

Repeat this idea with other authors. Find out as much information about each person as you can. This research will open new doors for you and probably stimulate you to read new and exciting books about these people; and after all, they're your favorite writers!

Your Own Newspaper

How much do you really know about a newspaper? What are the different sections? How are they usually placed? Which sections are larger than others? To whom are certain sections directed? From where does the information come? Who prepares the information for the local newspaper? How does a newspaper differ from a weekly or monthly magazine? How does the news reported in the newspaper differ from radio and television news? Where on a page can you find the most important article? Where are the less important articles placed? What advantages do stories accompanied by photographs have over stories without photographs?

Lay out your own newspaper. Be sure that you have carefully studied several of the local newspapers for the necessary background information. Plan the sections of your paper: national, state, and local news; business; sports; family section; movies, radio, and television; classified advertisements and other appropriate sections.

Either glue photographs on the pages near your articles or draw meaningful pictures. Try to relate the pictures or photographs directly to the story's content. This can add a lot of interest to your news articles.

Be sure that your stories have catchy headlines and subheadings. People generally read newspapers quickly. Unless the headlines promise stories of interest, they're likely to be passed over. News stories also are short and to the point. Most of the important information about who, what, where, when, why, and how is given in the first few pharagraphs. Can you write a brief, interesting article like that?

Your Own Magazine

Magazines are prepared for distribution once a week or even only once each month. This factor permits magazines to put more research into articles. More in-depth news coverage is provided. As with newspapers, magazines have a variety of sections, offering something for many different groups of people. Headlines and subheadings are important in magazines, too. The reader is likely to read certain articles if they have interesting titles. Pictures, too, can entice the person to find out more about events.

Pick a special interest of yours. Plan to develop a magazine about that specialty. If it happens to be photography, write some articles about film, cameras, lighting, and other related topics. Include pictures of your best work. Discuss where good photographs can be obtained. Remember to begin each story with a catchy title. Give the reader a lot of interesting information within the first two or three paragraphs. Maybe you'll want to include some cartoons and puzzles to add flavor to the magazine. Decorate the cover of your magazine with pictures and photographs about its contents.

Many different types of magazines can be developed: histories, hobbies, travels, favorite people, favorite pets, and other subjects. Research to prepare each magazine which you develop will be an educational and highly exciting experience.

Submit Articles to Magazines

Study the young people's magazine market. Discover what kinds of stories and poems are being published. Notice how long the articles and other items of content are. Study other parts of the magazines to gain a better understanding of the audience to which they appeal.

Write an article of your own. Specific guidelines can be obtained in books found in the public library. Writers' magazines are also very helpful. Be certain that your articles are typed according to the appropriate guidelines. Every page should be neat and perfectly clean. Enclose a self-addressed stamped envelope in the event that the material is not selected by the company to which you send it. Don't give up, however, if your material is rejected; continue to submit it.

Write Poetry

Not all poetry rhymes. Research the field of poetry. Delve into Haiku and poetic literature from other countries. Notice the topics which are used. Explore the way in which important thoughts are put into brief poems. Observe the unusual language. Note how expressions are used in novel ways.

Select a subject for your first poem. Be sure that you know a few things about this subject. Think through the story that you want to tell. What order of events do you want to unfold? What mental impressions go along with this subject that you want to leave in the reader's mind?

Write a poem without rhyming verse. Express your work in this "free verse" method of writing. Now go back and read each verse carefully. What impression did the work leave in your mind? Have other members of your family read it, too. What reactions did they have? Perhaps you'll want to substitute one word for another. Possibly you'll want to rewrite entire verses. Work your people, animals, and things into meaningful ideas. Express some emotions in your lines: love, fear, doubt, joy, regret, sorrow, pleasure, and others. Leave some ideas to the imagination of the reader. Spell out more clearly other thoughts.

Now attempt some rhyming verse. There are as many different formats to use as there are different kinds of poems. Some poems rhyme the first and fifth lines; other use the first and third; yet others rhyme the second and fourth lines. Try to balance the number of syllables in each line. If one line has many syllables and the other has few, the lines will seem awkward and labored. They should, instead move smoothly with meaning and rhythm.

Write as many poems as you can. There are many, many subjects from which to obtain good ideas. Draw some pictures to go along with your works. Paint some pictures. Take some photographs. Develop an entire book of your poems. Bind the book with hard covers and decorate them. Make a tape recording of your poems. Listen to them carefully. Study their evenness, communication of ideas, interesting format, and other facets.

Theme Reading

Select an area of special interest in reading: science, mathematics, history, geography, art music, language or any other. The first book that you choose will be the central theme. All other books will relate to this one book. Now read the book. Read as many other books as you can about this same special interest. Begin to compare the first book read with the ones which follow. Note likenesses and differences.

You will soon realize that when reading about the same subject, some of the books will repeat certain bits of information. Other books will expand information which was only briefly covered by other authors. You will gain more and more information about that one topic. See if you can describe the important contributions of this subject to our world. Tell how this interest area of yours has developed throughout the last 50 or more years. Explain what promise it holds for the future. No matter how much you read about this subject, there are many, many more books waiting to be opened by you. If you read enough of them, you are likely to become somewhat of an expert in this area.

If your reading in one particular area is quite broad, you'll soon become aware that information about the same subject can be expressed in a multitude of different ways. Some types of theme-reading disclose different plot developments. Other subtleties which surface are themes, tones, moods, implications, symbolism, novel langage, and writing styles.

An Everyday Matter

Because reading and language are present in our everyday activities, your gifted child and you will be able to use the suggested projects in meaningful, educational ways. Some experiences will be one-time projects while others will grow into larger and larger projects of involvement, continuing for weeks, months, and even years.

CHAPTER IV: MATH PROJECTS ADD TO YOUR RELATIONSHIP

Modern or Traditional: The Need Is the Same

Across our nation modern mathematics has been able to accomplish far less than was anticipated. The state of California recently supported a return to the traditional form of mathematics. Advocates of either curriculum would agree that mathematics must be meaningful. It can't be taught as dry subject matter.

You and your gifted child are surrounded by mathematics. Everywhere that you go and everything that you do involves this subject area. It shouldn't take an energy crisis to make people aware of kilowatts or the cost of gallons of gasoline. Mathematics should be alive, interesting, and exciting, not to mention educational. Many projects exist which can make this subject area just that. The value of undertaking such projects are far-reaching. The possibilities for your child and you to grow closer through these projects are also far-reaching!

At Home with Math

You needn't leave your home to begin meaningful mathematics' projects with your child. As before, some ideas take longer than others to understand. With patience, love, and understanding between your child and you, the learning which develops will be built on strong foundations. Concepts which are passed over today can be developed tomorrow, next week, or even next year. The important goal here is to become involved with your child and to see your child apply the subject matter in his or her everyday life. A few broad concepts are much more important than an endless list of facts and figures.

Kitchen Mathematics

Every time that meals are prepared, mathematics is utilized. A cookbook recipe calls for 2/3 cup warm water, 1 package active dry yeast, 2 tablespoons sugar, ½ teaspoon salt, ¼ cup soft shortening, 1 egg, and 1 2/3 cups flour. The recipe makes about 12 buns. Now suppose you're expecting company for dinner and need 24 buns. You and your child can sit down and determine what you will have to do to prepare twice the aforementioned recipe. Why not have your child pour the recipe ingredients and mix them per the instructions? Perhaps 24 buns won't be enough. What needs to be done to prepare 30, 36, 40, or 45 buns? What if the original recipe was too large? How can it be cut down to a serving of 9, 6, or 3 buns?

Look at the requirements for mixing frozen juices with water. How much water must be added to produce 1½ quarts? Three quarts? A gallon?

Don't overlook the many other foods which require the addition of water, milk, cream, and other liquids. In each case your child can participate

in a meaningful use of mathematics. Have you ever given him or her the opportuinity before? Does your child know how to do it already? If the answer to the second question is no, perhaps it's time to start.

Other Opportunities. Let's look at other kitchen mathematics project opportunities:

1. Candy Making
2. Baking Cookies and Cakes
3. Making Ice Cream
4. Preparing Salads
5. Preparing Salad Dressings
6. Making Gravies
7. Making Soups
8. Preparing Appetizers
9. Making Dips
10. Preparing Snacks

Becoming Acquainted with Utensils

Much learning can come from familiarity with common household utensils:

1. Rolling Pin
2. Pastry Cloth
3. Pastry Blender
4. Cutting Board
5. Cutlery Set
6. Strainers
7. Bottle and Jar Openers
8. Colander
9. Grater or Shredder
10. Pancake Turner
11. Vegetable Peeler
12. Lemon Squeezer
13. Funnel
14. Kitchen Tablesoons
15. Kitchen Teaspoons
16. Vegetable Brush
17. Slotted Spoon
18. Kitchen Scissors
19. Tongs
20. Electric Mixer
21. Electric Toaster
22. Rotary Beater
23. Wooden Spoon
24. Mixing Bowls
25. Pots, Pans, and Dishes
26. Oblong Baking Pan
27. Bread Loaf Pan
28. Square Pans
29. Baking Sheets
30. Muffin Pans
31. Pie Pans
34. Custard Cups
35. Pot Holders
36. Set of Nested Dry Measuring Cups
37. Liquid Measuring Cups
38. Set of Measuring Spoons
39. Spatula
40. Potato Masher
41. Wire Whip
42. Tube Pan
43. Utility Pan
44. Round Layer Pans
45. Roasting Pan With Rack
46. Dutch Oven
47. Pressure Cooker
48. Kitchen Thermometers (Meat, Candy, and Fat)
49. Food Chopper
50. Food Grinder
51. Griddle
52. Gelatin Molds
53. Ladle
54. Jelly Roll Pan
55. Kitchen Timer
56. Refrigerator Containers
57. Electric Blender
58. Knife Sharpener
59. Souffle Dish
60. Melon Ball Cutter
61. Garlic Press
62. Cake Safe

Helping with Cleaning Jobs

Whether the project involves cleaning the carpets or scrubbing the kitchen floor, detergents often require mixing with water. You and your gifted child can read the directions and prepare the appropriate solution of cleanser and water. Other ingredients, other than water, are called for on occasion. These times afford opportunities not only to work with other chemicals, but to incorporate mathematics in the mixing.

Different mixtures can be observed in terms of the cleaning jobs they produce. Some mixtures might be intentionally weakened for the sake of leading to the correct mixtures and, in the process, learning experiences.

Purchase of Floor Coverings

From time to time families purchase floor coverings. Usually, wall-to-wall carpeting is part of the purchase, at least for one or more rooms. Mathematics is intricately involved in such a purchase. Together, the parent and child can determine the quantity of material needed. When the room is square or rectangular, obtaining the length and the width is a fairly easy task. Multiplying the two measurements provides the amount of carpeting needed in square feet.

The preparations for throw rugs can be done more simply. Available space can be determined when the size of the planned purchase is subtracted from the total available space. Different positioning of the rug, or rugs, can afford maximum opportunities to have attractive, functional home additions.

The quantity of liquid needed to clean floor coverings provides another opportunity to use mathematics. Most bottles indicate a formula for preparing the cleaning agent. Measuring the square footage of carpeting can lead to the correct amount of liquid required.

Wall Decorations

Pictures and other ornaments need to be placed on walls straight and attractively. Finding the center of a wall is a good learning experience for your youngster. Next, it is necessary to determine a way to find a particular height on the wall so that pictures or other objects will have even placement. Thirdly, spacing the pictures so that some are not too close together and others too far apart, is necessary. Some modern trends nullify the aforementioned placement. However, it is still important to know how to space objects on a surface.

Wall Coverings

Mirrors, wallpaper, hanging fabrics, and other items are used commonly these days. All of these require measurements to insure that the appropriate quantities are obtained. Because of the expense involved, miscalculations can prove to be very expensive. The parent and child can become engaged in careful measurements and re-measurements. The joy of seeing the job completed, with the knowledge that your measurements were accurate can be highly rewarding.

Outside of the House

The garden lends itself to more mathematics. How much area will a ½ cubic foot bag of peat moss cover? How far will a pound of rose food go during the monthly, in season, feeding? How much insecticide is required to spray the bushes when the dilution formula calls for 20 parts of water to one part of spray? How much liquid plant food is required to fertilize the front yard plants? How do you dilute the plant food when the label suggests that five parts of water should be added to one part of food? How many bags of organic fertilizer are needed to cover the rear lawn if you have 120 square feet and each bag contains two cubic feet? How much grass seed is needed to seed the side lawn (4' x 60') when the bag indicates that there is enough rye seed inside to cover an area of 50 square feet? How many bags of potting mixture must you purchase to fill your four one-gallon pots if each bag contains ½ cubic foot?

The above mentioned examples are but a few of the everyday mathematics problems that arise around the house. Often guessing is done in place of careful figuring. Think about the educational value that can come from your child and you facing the problem together. Consider the unity involved in planning some possible solutions and then testing these guesses. The results of the actual experiments can lead either to success or further testing of other possibilities. It's no disgrace to miscalculate. It's no cause for remorse to be stymied; growth comes from difficulties. Difficulties can lead to unforgettable learning experiences. Not all solutions come immediately either. Patience and careful thought can bring forth an answer the next day, week, or month.

Woodcrafts. Woodworking involves measuring, leveling, engineering principles, and other skills. Consider the construction of a simple animal cage by your child and you. Employ some of the earlier-learned art principles to design an attractive, practical cage. Determine what materials will be needed and where they can be purchased. Consider the quanitites of materials needed. Cutting the lumber to the correct sizes involves careful measurement with one or more types of measuring instruments. Sanding the cut pieces of lumber to the proper degree of levelness will require the use of other mathematical instruments. Bracing the structure for the maximum degree of strength requires other mathematics principles. What about the size of the cage door? Will it be large enough to accommodate the aminal today and in the future?

Perhaps you and your child will want to design and build an exercise pen for your animal. Be sure that you use the available space to its best advantage.

An Allowance

Another practical mathematical exercise is realized through a child's allowance. The child may provide some assistance to his or her parents to warrant receiving an allowance. The money the child receives should be used prudently. How much money should be saved? How much should be spent for entertainment and recreation? How much should be spent for books and other needed items? Many choices need to be made by the youngster. The parents may hope they will be mature choices.

A work schedule might be developed cooperatively between the child and the parent to give the child opportunities to rate each job. For example, some jobs might be worth more than others. Cutting the lawn might be worth more than taking the trash out once a day. Edging the lawn might be worth more than watering the shrubs. Once priorities and values are established, the youngster might wish to be assigned only the highest paying responsibilities. Perhaps combinations of jobs might produce a bonus system,paying more for two jobs of one kind and one job of another than would be possible working only two jobs.

The pie graph is a logical project to undertake in connection with the child's allowance. A section can be divided for each job undertaken. For example 30% of the child's time might involve indoor responsibilities. Perhaps 60% of his time would be involved with outdoor responsibilities. The remaining 10% of his time schedule might involve responsibilities away from the home, helping with nearby relatives or friends.

A pie or circle graph could also be used to show the child's allocation of his allowance for the various categories: recreation, entertainment, saving, books, supplies, and others.

Record Keeping

The adult is often engaged in record-keeping activities: checking accounts, income, expenditures, insurance policies, shopping budgets, credit card summaries, and others. The child can benefit at an early age from guidance with record-keeping activities. Here are some ways that the parent and child can start:

1. Maintain a height record of your child (monthly)
2. Maintain a weight record of your child (weekly)
3. Keep records of the child's cash gifts
4. Maintain book-purchasing records
5. Keep records of clothing purchases
6. Record hours of sleep which the child gets nightly
7. Calculate the quarts of milk that the child drinks (weekly)
8. Determine the distance that the child walks (monthly)
9. Find the number of television programs watched by the child (daily)
10. Determine the number of telephone calls made by the child (monthly)
11. Find the number of hours of play schedule for the child (weekly)
12. Maintain a record of time devoted by the child to homework (weekly)

In the Community

There are many exciting community-related mathematics experiences. The child soon realizes that the community is a practical laboratory for using his mathematics skills, concepts, and skills.

Shopping for Food

Read the food advertisements in the local newspaper. They usually appear toward the latter part of the week. Together the parent and child can determine which items need to be purchased to provide main food courses for five or six days. Each meal should provide for a balanced diet: meat, fish, or other appropriate protein, the presence of a green vegetable, wheat or

another grain; another vegetable selection; a milk product; a dessert; and an appropriate drink. Which grocery stores have the best buys? How much will it cost in gasoline to travel between two stores?

It will take much planning at first to determine which food selections offer the best values. It is further necessary to know which supermarkets or local stores sell products for the least amount of money. This kind of information will come about more quickly through actual visits to many stores.

Packaging. In the store, notice with your child the various sizes of jars, bottles, cartons, and packages. Together read the contents to compare ingredients. Then compare weights. How many of the large containers does it take to provide the same quantity as the giant container? How many of the smallest containers does it take to equal the weight of the medium container? Round off your answer to give yourself a quick calculation. Practice will make your child and you more skillful at this mental arithmetic. Use paper and a pencil until you're comfortable doing the process in your head. Remember that when you round off on one item, you have to round off on the other one, too, so the answers are comparable.

Packaged Vs. Bulk. Notice which items are sold in bulk. Why is it that this method of merchandising is used? How do quantities of these items compare with packaged items of the same commodities? What bulk items come in sacks? What is the largest weight of bulk rice that your store carries? How about beans? Why are certain fruits and vegetables sold in bulk? What items of food come in large cans? What is the difference between bulk fruits and canned fruits and fruit juices? Which method of purchase is less expensive? What is the difference in cost between canned vegetables and bulk vegetables? What about a comparision of vegetables and canned juices in terms of cost difference?

Day-Old Bread Items. Why are certain bakery items discounted the day after they are received in the store? What is the advantage of buying some of these items?

Bruised Foods. What can be done with bruised fruits and vegetables? Can they turn out to be sound food purchases? How can they be prepared at home for use in the far-off future?

Dented Cans. Why are cans with slight dents sold at greatly reduced prices? What are the dangers of buying these items? What are the advantages? How much are you saving between a particular dented can and the regular shelf price? Compare some other dented items with their shelf companions. What did you discover?

Frozen Foods. Notice the cost of fresh oranges compared with a can of frozen orange juice concentrate. How many glasses of orange juice can be prepared from the frozen can's contents? How does this compare with a can of orange juice on the store shelf? Which is the best value of the three. What are the reasons that some people buy frozen juice, canned juice in the quart cans, or fresh oranges? Notice the price comparisions between frozen packages of vegetables and fresh vegetables? What are some of the differences in price? Why do some people purchase frozen vegetables? Why do others purchase fresh vegetables?

Coupons. What are the advantages of using coupons for the purchase of newly introduced and established products? Why do established companies make coupons available to your family through the mail? Why are other coupons printed in magazines and newspapers? Why are free samples sent to your home? How can coupons save you and your family money?

Select School Lunches

Using your experience shopping for well balanced, inexpensive food selections, prepare a plan for school lunches for one week. Use the newspaper food advertisements to locate the best bargains. Provide for variety from day to day. Follow a specific budget, dividing the total amount of money available into five days as nearly as you can.

A Bank Account

How many young people understand the purposes which the local bank has? How many can see the important part that the bank can play in their lives?

It is important for the parent and child to visit the bank regularly to participate in the roles of savers and borrowers. The child's bank account doesn't have to be large; a dollar or two deposited weekly or less often will be adequate. Many important mathematical functions can be motivated through the use of the bank: addition of savings, subtraction of money through withdrawals, posting of interest, and others. Annual interest rates can be compared with semi-annual ones. Certificates of deposit and other long range instruments can be examined.

It is not too far fetched for a young person to borrow money from a bank or savings and loan institution. Perhaps he prefers to use his money for other purposes at the present time. It is also possible that the youngster doesn't have enough money to support a major purchase and must either ask his parents or borrow from another source. The child can borrow money for a bicycle or other item on his parent's signature and with the child's promise that he will pay so much money each month. Think of the satisfaction that the child will receive from consistently paying off the debt until no further money is required of him.

Other practical borrowing ventures might incude securing money to initiate a lemonade stand, borrowing resources to purchase a garden tool used to mow the neighbor's lawns, acquiring money to purchase kits of art materials which can be sold when assembled to hobby shops, and securing a loan to buy rabbits for commercial breeding purposes. These reasons or any one of them can lead the youngster, with the guidance of his parents, into a future of free enterprise. He can grow to know the value of money, understand the purposes of banks and other institutions, and gain satisfaction from earning his own money.

The Stock Market

In the child's understanding of the newspaper, many important facts and concepts were learned: the parts of the newspaper, the source of reports, the recency of the articles, and other specifics. With a little direction, the child can see the listing of many common companies on the pages of the

business section. He can purchase an imaginary stock. The specifics about the stock can be recorded: purchase price, high on that day, low price on that day, and number of shares sold. A record of the stock can be kept, daily, for a month. During this time pamphlets, booklets, and other materials can be obtained from a local stockbroker. A copy of the ***Wall Street Journal***, ***Barron's***, and other publications can be examined. Business magazines can be viewed at the local library. A visit can be made to a brokerage firm. Annual reports and quarterly summaries can be read there. Reports about the child's imaginary stock can be read. A discussion with one of the brokers can furnish the child with information about how stocks are bought and sold, why the brokerage firm lends money to individuals, why the office features the tapes of major stock exchanges, why some offices provide news on the "broad tape", how dividends are paid, how averages are computed, and other related items. Many additional materials can be taken home for review at a later time.

Now the child is ready to make some stock choices. He can select the stocks of three companies which manufacture or produce goods and services. The selling price of each stock, on the day he selects it, can be recorded. This should be the closing price for the day. The youngster should select the three stocks on the same day if possible. A day by day record of the stocks' closing prices should be kept. The volume of each may be kept if the child so desires to do this. A graph of each stock can be maintained, connecting the closing price of each, daily. Soon price fluctuations will be visible.

At the end of a month, have the child sell two of his stocks. This decision will involve several chances. Which stocks will do poorly in the future? Which new stocks will do as well or better than the stocks to be sold? Which companies out of all the possibilities will do well during the coming month? The two stocks sold should be calculated to indicate the profit or loss which has occurred during the past month. A running balance should be maintained.

With the selection of two or more stocks, the child is ready to draw two new graphs. The three charts will be kept, daily, during the next month. Once again, at the end of a month's time, two of the three stocks will be closed out. Again, the results of the sale should be recorded.

In time the parent and child might wish to purchase one share of an inexpensive stock, one which preferably pays a dividend. The stock can be watched and charted with personal involvement. The dividend can be added to the child's bank account four times each year. Along with one's ownership of a stock comes the privilege of voting, receiving quarterly reports, receiving annual reports, and information about periodic company developments is shared with the stockholders. A local brokerage firm might consent to mail your child information about how other experts view the accomplishments of the company in which he holds his share of stock.

Adding the volume of stock transactions for the child's company for one week can give him good practice with addition of large figures. Subtracting the week's volume figures from the prior week's ones can provide the youngster with practice in that process. Fractions can be learned in a practical setting from the daily fluctuations of the child's "company." An understanding of the process of per cent will develop from a careful study of dividends paid on the share of stock.

The Bond Market

Much learning can develop from the study of bonds. Why do companies issue bonds? What does the purchaser get in return for his purchase? How long is the bond issue? Where can you purchase one? What is the difference in price between a given bond and a given share of stock? Which pays more interest, stocks or bonds? Which has greater growth potential? What are some common companies which issue bonds?

Perhaps the child can purchase an inexpensive bond. He or she can grow in understanding through examination of the business section, deposit of the interest payments in his bank account, examination of volume figures, and reports from the company.

Involvement with a Checking Account

While a child needn't have his own checking account to benefit from the related mathematics involved, he can learn much from his parent's checking account. The parent can show him the desposit slip and how it is used to add to the account. The child can learn the technique for writing a check. An understanding of the time required for a check to clear can be explained. The safe keeping of cancelled checks for future reference can be shared with the youngster. Monthly statements, showing checks issued, deposits made, charges, and other details, can be explained to your child. All of these are common in the life of most adults. It's worthwhile for a child to get involved in learning about these concepts as soon as possible.

Service Charges

Share with your child other everyday financial arrangements which might or might not be known by your child. One of these expenses is the service charge. Discuss how you are involved with service charges:

1. With your checking account
2. With your department store charges
3. With gasoline charge cards
4. For the delivery of furniture, appliances, and other items
5. For purchases of tickets at decentralized locations
6. For time payments on loans, stock purchases, and other financial arrangements.

Real Estate

Take an automobile ride through your neighborhood. Point out to your child that some houses are offered for sale. Drive past the office of a real estate broker. Notice the name on the office. See if you and your child can identify a sign on someone's property with the name of the real estate firm. Schedule a visit with a broker. Ask to see the listings. Discuss, briefly, how the broker becomes aware of homes for sale. Find out how he or she is paid for services. What specifically are the services? Who works with the broker? Is there more than one office? How extensively is the work to sell a particular house? Does the broker list businesses and apartment buildings, too? Are vacant lots and raw land listed? What involvement is there with legal dealings? What is escrow? What is a mortgage? Does the buyer have to have all of the purchase price at one time? How much can be given as a down payment?

Where can the buyer borrow the remainder of the money? Can the original owner lend part of the money to the buyer? How much does the borrower pay for the use of the money?

A Model Economy

Together with your gifted child plan a new country. It is located near the ocean. It has mountains, valleys, deserts, and plains. It is populated with happy, hard-working people. The country has adequate rainfall, wild and domestic animals, natural resources, fertile soil, and neighboring countries populated with peaceful, hard-working people.

Develop some industries using the raw materials and other natural resources which exist. Organize a way to trade farm products, manufactured goods, and other items. Organize a government, financial institutions, and other components of the country.

How would your country establish relations with the neighboring countries? What goods and services would you offer? How would you encourage production in your own country? Where would you sell extra goods and products within your country? How could you stimulate the maximum number of jobs? What would you do to encourage the production of badly needed goods and services?

This project can involve your previously learned art skills. Draw some different geographical regions. Show the people engaged in commerce. Make some panoramas showing the cities and towns. Indicate means of transportation, recreation, religion, and other important topics. Design money and stamps for your country. Let your imagination and creativity lead you in many different directions.

Probability

You and your child can have many hours of enjoyment exploring the strange and fascinating world of probability. There are opportunities all around you to put your guesswork into action. What is the probability that you will find a good seat in the local movie theater this Saturday afternoon at 3:30 p.m.? What are your chances if you go an hour earlier? An hour later? Are your chances better if you go on Sunday or on Monday?

Look at your own home. How likely is it that the paper will be delivered at the same time every day this week? How many yellow automobiles will park in front of your house this week? How many new flowers will bloom within the next five days? When will the mailman deliver mail to your house on Saturday? How many times will it rain next week and how many times will you have to water the lawn? What number of dinners next week will contain meat items? How many will have main dishes of foods other than meat?

Establish guessing as a means of predicting. Discuss the factors which play against the event's possibilities of happening. Each event has negative factors: weather, sickness, mechanical errors, human errors, and others. Consider those factors which favor the event happening: skill, experience, mechanical assistance, human assistance, desire, dependability, enthusiasm, and many more.

Probability leads into the use of charts and graphs for worthwhile purposes. One event can be shown on a graph using one color. A second event might be indicated with another color on the same graph. Once again, use pie graphs, line graphs, bar graphs, and others.

Mathematical Games

A multitude of enjoyable games can be made (and purchased) for the extension of mathematical skills and concepts. For example, measure a square piece of wood so that one inch squares appear on its one side. Pound medium-size nails into the wood (only far enough so they are able to stand by themselves) at the points where the lines meet. Now use a rubber band to stretch around the neck of the nails. Stretch the rubber band so that it forms a square. Now form a rectangle. Use two rubber bands. Create two triangles. Divide a large square into two smaller squares. What other shapes can you form with the rubber bands?

Use your imagination to develop games about these topics:

1. The Calendar
2. Money
3. The Fifty States
4. The Thermometer
5. Magic Numbers
6. Fitting Shapes Together
7. Counting Birds
8. Roman Numerals
9. Longitude and Latitude
10. Measuring with Your Own Shadow

Ancient Number Systems

You and your child will be interested to study about number systems other than the one we use. What systems were used by these peoples?

1. The Chinese
2. The Hebrews
3. The Romans
4. The Greeks
5. The Mayans
6. The Babylonians
7. The Arabians
8. The Hindu
9. The Japanese

Other Mathematics Projects

There are other projects which offer short and long-range opportunities for enthusiastic educational learning. Others will spring naturally from the basic ones suggested here. Let them fit your child's motivational needs.

Height and Weight Records

Develop a graph or chart on which your child's height and weight can be recorded. Place the graph in some convenient location to maximize its motivational potential. Decide at what intervals the two of you will record data: every week, every other week, each month, or otherwise. Determine how these readings will be obtained: instruments to be used, who will perform the measurements, where they will be performed, and other details. Observe the fluctuations in your child's weight and, possibly in his height. Relate the figures to the seasons of the year, periods of high activity, illness, and other circumstances. Relate the readings to the high quantity and selection of food eaten from time to time.

Home Utilities

The "Energy Crisis" has made people more aware of the use of natural resources. This crisis can be used to good educational benefit. Together, locate the gas meter, the water meter, and the electric meter. Study the dials to determine how the energy units are recorded. The public utilities have printed very good materials dealing with meter reading.

Use your record-keeping and graph skills to record the initial data for each utility. Read the dials every three or four days and record the new information at these intervals. Compare your energy use with the previous weeks and months.

Find out how many kilowatts are used on the average by each home appliance each month. Utilities have been studied to determine this information. Booklets are available from public utility companies. Plan a program to conserve 15 to 20% of your energy each month. Experiment with different schedules, alter the use of laundry appliance from daily use to twice weekly. Survey your electric bulbs to determine which ones can be reduced in wattage. Test the illumination or candle power levels to make sure eye strain doesn't result from altering bulb sizes.

Experiment with your use of water. Perhaps the lawn and garden can be watered less often. Possibly the shower can be kept running for less time each time it is used. Modify the force of water that is used when you wash your hair, brush your teeth, and wash your hands and face.

Use your art skills to make some simple posters and pictures about energy conservation. As a family, debate the pros and cons of conservation of certain energy sources in the home. Try to reach a workable agreement among all of your family members!

The Metric System

The metric system will soon be widespread in the United States. Why not get a head start with this novel system of measurement? You and your child can learn it together. It involves linear measurement, square measurement, cubic measurement, liquid measurement, and measurement of weight. Learn the units in a practical manner: purchase test tubes, measuring cups, and rulers which indicate metric measurements. Pour liquids from cups, pints, quarts, and gallons into the metric containers. Notice the comparisons. Compare your household rulers with the metric instruments used for linear measurements. When you go to the gas station, calculate how many liters you would have received. Determine how many kilometers you would have traveled in place of miles. Think of your food purchases in terms of kilograms instead of pounds and ounces.

Instruments which Involve Mathematics

Read about and visit locations where you can see and handle scientific instruments which involve mathematics:

1. Accelerometer
2. Altimeter
3. Ammeter
4. Caliper
5. Fathometer
6. Manometer
7. Micrometer
8. Slide Ruler

Explore Other Measurement and Date Systems

1. Apothecaries
2. Avoirdupois
3. Troy
4. Surveyors
5. Gregorian Calendar
6. Aztec Calendar
7. Julian Calendar

The Sum Total of Happiness

You and your gifted child can spend many happy hours together exploring these mathematics projects. Many equally interesting side-learnings will develop. Some of this will prove to be as enjoyable as the main projects. The real joy, however, will come from the close relationship which will develop between your child and you. This closeness will come from togetherness: exploring, experimenting, creating, and laughing. No subject is dull when you can share the experience with some one as close to you as your own child.

CHAPTER V: MORE HARMONY WITH MUSIC

Fun With a Neglected Area

Another area of the curriculum which is too often neglected is that of music. Children find music appealing from the first time they're able to shake their rattles to a few bars of music over the radio waves. Music is natural; it's relaxing; it fills our ears and hearts with joy.

A parent needn't have expertise in this area to share it with his or her gifted child. The parent needn't play an instrument or even be able to sing a brief verse from a popular melody. What is needed, however, is a willingness to do some simple research, to travel to some nearby facilities, and to share the total experience with the youngster.

Activities in Music for You and Your Child

A Little Background History

A few visits to the library will answer some discussion questions that you and your child might raise about the history of music: When and how did music begin? Why was it used long ago? What kinds of instruments did early man fashion? What materials were available for making instruments? How were the instruments used? Who was trained to use the instruments? What were the limitations of early instruments? What is an example of an early musical score? These questions, and more, will start you on your way to an interesting and highly exciting adventure into the world of music.

What period of musical history are we in as you read this book? What developments of note are taking place and have recently taken place? Who are the composers of note? Which orchestras are world-famous? Is there evidence in your city or town of any of the former musical periods? What do you predict will take place in musical history in the near future?

Hear Music in Your Home

You and your child can become familiar with the appearance and sound of instruments in each of the four families: brass, wood winds, percussion, and strings.

Listen to the various types of music to identify the predominate instruments. Notice whether they play major or minor roles in the compositions. Listen to find out whether their sounds are light or heavy, smooth or harsh.

Listen for the accented beat in different selections; you'll feel its heavy hand. Become aware of the pulse of the music; like your own pulse, which makes its rapid self known to you throughout the composition.

Hear happy music as well as sad songs. Sometimes it's fun to hear music without knowing the title of the selection. All the time that you hear it played, guess what story is told or picture is painted. Before the selection ends, make up your own interesting title for it. See how close you can come to the true title and topic.

Balance your musical diet. Just like with reading, variety opens new worlds for you. Music is communication; let it send its message to you.

Electronic Music and You

Make some simple rhythm instruments. Cover an empty coffee can with a circular piece of rubber. You now have a simple drum. Strike two sticks together. This is another rhythm instrument. Fill a can with small stones. Cover the top with plastic and secure it with a piece of string. Now you have a variety of instruments. How many more can you create?

You and your child can figure out some simple rhythm patterns. Turn on the radio and accompany the music. Eventually, turn the volume on the radio down. Accompany the music carefully. Experiment with different paterns of rhythm. Use a variety of musical selections.

Using a tape recorder, with the music playing at a medium level, record your musical rhythmic accompaniment. Play the tape to notice if your contributions melded smoothly into the music or if they were harsh and unnatural. Experiment with many different compositions, some with vocal selections and others with instrumental emphasis.

If two tape recorders are available, record one at the regular speed and the other at a slower or faster speed. Compare the two recordings. Play the two tapes at the same time. What do you notice? What could you call your creation? Vary the musical pulse. Vary the accented beats.

More Dignified Rhythm Instruments

Build a wooden box using thin pieces of lumber and place the box on a table or other firm base. Cut a circular hole in the middle of the top piece of wood. String nylon across the hole and strum the nylon. Notice what sound can be heard. String longer pieces of nylon. Strum them again. What's the difference now? Hold on to one piece of string. Strum it as you shorten the length of the nylon in between your two fingers. What happens?

Cut notches in a piece of wood cut 12 inches in length from an old broom handle. Run a stick over the notches. Listen to the sound. Now hold the stick by its tip. Run it over the notches again. Is the sound the same? Why or why not?

Visit the Community

Many free and inexpensive musical performances are available to you and your child in the local community or within a reasonable distance from your home. Some of these include the following:

1. Campus Concerts
2. Recitals
3. Concert Bands
4. Music Festivals
5. University Singers
6. Seasonal Concerts
7. Wind Orchestral Groups
8. Chorales
9. Choruses
10. Young Symphonies
11. Chamber Music
12. Jazz Bands
13. Modern Dance Groups
14. Ballet Corps
15. Folk Dance Companies
16. Historical Music Pageants

Learn to Play a Simple Instrument

There are many simple instruments which can be mastered with relative ease, using excellent instructional manuals. This will be a fun-type activity for your gifted child and you. One person can accompany the instrument-player with some of your rhythm instruments. Tape record your musical selections. Analyze the results.

Form a Collection of Records or Tapes

Together, based on your broadening musical tastes, purchase records or tapes from time to time. Balance your collection so that it includes samples of all types of music. Share the collection together. Enjoy the wonderful musical contents often!

Listen to Musical Specials

Become acquainted with the AM/FM directory of musical programs which are offered regularly. Choose ones which are suitable for the age level of the child and appropriate hour of the day. Read background information about the compositions and their composers. Following their presentations, discuss what you enjoyed most about the programs.

Watch Televised Musical Programs

There are many musical programs on television. Use the resources of UHF and VHF stations. Sample many different kinds of programs. Balance your musical diet with well-rounded offerings. Discuss what you see and hear. Identify the family of symphonic instruments. Analyze the sounds of the sections of the orchestra. Listen to band music. Appreciate the contributions of the various instruments. Hear rock and roll music. How has this new musical development affected our culture? What are the positive contributions which it is making? What are some of the less favorable aspects of this music.

Many Happy Songs

Music is everywhere. The potential for enjoyable experiences in the area of music between your gifted child and you are many. Take advantage of this available resource. You'll soon discover which activities are best suited to your child and you. Not all of the projects suggested need be pursued. Select the ones which you know will work best. The quantity is not as important as the quality. The most important thing, however, is the experience of you and your child working together in the exciting area of music education and sharing what this area of study has to offer together!

CHAPTER VI: SATISFACTION THROUGH SCIENCE

Developing Your Child's Natural Curiosity

One of the most interesting subjects for a child, and one which most adults find fascinating, is science. Many, many opportunities exist right in your own backyard for project undertakings. A majority of these experiences involve working with plants, animals, and manipulative materials. Opportunity after opportunity presents itself for employing the "scientific method." Discovery is ever present, too. There is truly satisfaction in science.

Science in Your Own Backyard

Look at your backyard. What do you see? How could a child possibly benefit from a closer look at it? What sources of on-going projects exist there? Let's look at some.

Plants Are Different. Look at roses and violets. If you don't have these two particular flowers, choose any other two. How are they alike? Both grow in soil. Both have stems, branches, and leaves. The color of these parts are similar for both flowers. But what about the actual coloration of the two? They are quite different. There are different aspects of the two flowers, other than in coloration. What are they? Height might be one. Shape is another. Number of flowers and size of each might be other differences. Need for differing amounts of water, sunlight, soil, and pruning are other possible differences.

The library is a good source of instant information about flowers. There are many outstanding books about flowers, at an appropriate reading level for children. Many of the books have colorful pictures and excellent illustrations of flowers and their parts.

How Suited Are Your Plants? Are they in the correct locations? Roses, for example, benefit from direct sunshine. Camellias, on the other hand, need more shade. Do your flowers all bloom at the same time of the year? If this is true, your yard is without flowers much of the year.

With a little planning, you can have roses, camellias, carnations, Easter lillies, azaleas, geraniums, and chrysanthemum varieties all in your backyard, with a variety of colorful flowers throughout the year. This is a project that your gifted child and you can do following careful planning, which should include a visit or two to the local nursery. The library will furnish instructions about soil needs, sun locations, the correct time of the year for planting, and other necessary information.

Taking Care of Your Flowers. Unfortunately, flowers don't grow by themselves, devoid of care and attention. Required care opens other doors for the two of you. Develop a systematic schedule for maintenance of the flowers.

This should include the following:

1. Weeding
2. Feeding
3. Watering
4. Pruning
5. Adding needed soil
6. Spraying insects

This schedule will point out many important gardening functions to your child, and possibly reacquaint you with a few, too. The child will learn from weeding that not all growing things are desirable. He or she will begin to understand that weeds compete for the valuable nutrients which are present in the soil in limited supplies. Weeds also, the child will learn, choke off the space needed by the flowers' roots for growth and development.

Feeding plants will emphasize to the child the benefits of supplementing the diet of the flowers, just as one's own diet might be supplemented by vitamins and minerals. Flowers differ in their feeding requirements. It will be interesting for the child to work out an effective plan for remembering which flowers to fertilize when the feedings come due.

Watering is a good experience. The flowers will give him some help with their schedule. Drying, wilted leaves and flowers point up the requirement for more water. Healthy, green leaves, along with beautiful flowers, well-formed branches, and supportive stems, indicate adequate watering.

It is necessary, your child will learn, to prune away crooked, dry plant parts in order to promote more healthy growth. At the end of the blooming season, it is particularly important to re-shape the plant into a manageable form. With roses, dead wood actually takes nutrients from the plant needlessly. Buds grow into flowers and then die. If the flowers remain on the plant for any length of time, they too, use the energy of the plant wastefully. It is a worthwhile learning experience, in some cases, to allow several dead flower pods to turn to seed. These seeds can be planted to demonstrate the plant's cycle.

Soil, like many other things, has limited offerings over an extended period of time. Certain flowers make greater demands on the soil than others. When the quality of the flowers declines, it is time to add to the soil. The wise gardener will add nutrients to the soil well before danger signs begin to appear. The library can give your child and you good guidance about kinds of supplements necessary for particular plants. Books, and informal talks with nurserymen, will uncover needed steps to take to enrich the soil. Often new chemicals are sold in nurseries which were developed after the printing of up-to-date garden books.

Insects always seem to find healthy plants a source of delight. The parent and child can turn this insect problem into a source of beneficial learning. Inspect your flowers together. Draw sketches of the unwanted visitors. Use a magnifying glass to improve observation. Put some specimens under a microscope if you happen to own one. Visit the local library to identify the variety of insect and the prescribed treatment necessary.

In certain instances, a hard spray of water will remove insects effectively. Other varieties are more stubborn and require powders or liquid sprays. Some chemicals are combined with plant food so that as the plant draws the food up into the plant, insecticide accompanies the nutrients. This process results in the elimination of the pests.

Plant Experiments

Pot a plant. Be sure to select the appropriate size pot. If it is too small, it will not support the size of the plant. The roots, too, will be too congested to grow adequately. But what about the potting soil? Should you just use any soil which is available in the yard? Why not? You can prepare your own soil by mixing leaves, grass, and soil together. It is best if you can set aside an area in your yard where leaves, grass, and soil can be stored together for months and months. As these ingredients undergo decay, important plant food will be developing. Perhaps you'll want to purchase some potting soil. Be sure that the soil is placed in the pot carefully, leaving enough room for the plant. Fill in the area around the plant with additional potting soil. Now give your plant a good, long drink of water. Through library research, you will know where the plant should be placed to provide it with the necessary amount of sunlight. Be certain, too, that the plant receives the necessary water so that it will grow and thrive.

Measure Your Plant. Prepare a graph for your plant record. Give your graph a title that tells briefly about your experiment. Place graduated inches on the left-hand side: 1", 2", 3", etc. Place the projected dates on the base or bottom line. These dates can progress by days, by every-other-day, by weeks, or any other convenient way chosen.

Record the growth data. As the days pass connect the points on your graph. If you use dots, connect the series of dots weekly. If your graph is a bar-type connect the mid-points with lines. Whichever method you select you'll soon see that the rate of growth will be in an upward direction. Your plant will grow more quickly at certain times. There will be times when the growth comes to a halt. What other observations can you make about the plant growth?

Calculate the Leaf Growth. How many leaves develop on your plant in one week? How many grow during a period of one month? Some interesting observations can be made about leaves other than numbers which develop. What are the shapes of the leaves? Are they all the same shade of green? Do the leaves change colors? If so, when does this color change occur? Are all of the leaves the same size? Where are the larger leaves? Where are the smaller ones? Why does Nature provide for this difference in sizes?

Weigh Your Plant. Using a simple cooking scale or other available kind, weigh your plant from time to time. Keep a record of your findings on a graph. What do you notice about the weight of the plant (including the pot and soil)? How can you account for this?

Experiments With Soil. There are basic soil types. Depending on the geological activity in the community where you live, soil types will vary. Forest regions differ markedly in soil types from those found in desert locales. Rainfall, nearness of mountains, plant and animal life, and other factors contribute to different soil types.

Prepare a pot with clay soil. Prepare another pot with leafy loam. Place sandy soil in the third pot. Finally, place rocky soil in the remaining container. Into each pot place a lima bean. Provide each container with the same amounts of water, plant food, and other nutrients. Expose each to the same amounts of sunlight. Graph your results.

What did you learn from this experiment? What soil type or types will you choose to start a new bean plant next time? Which soil type produced the worst results? Can you explain why? What could you have mixed with this soil type to have improved it?

Experiments With Plant Needs. Plant a lima bean in leafy loam soil. Do the same thing three more times. You should now have four containers of leafy loam, each with a lima bean planted inside. This experiment is designed to isolate the basic needs of plants: sunlight, soil, water, and air. Cover one plant with black paper making a drape which slips on and off with ease. This will block its access to sunlight. Place another plant in a large jar with a screw-on top. This will prevent it from getting enough air. Remove the soil from the next container and place the bean back inside the empty container. This plant will be denied soil. Do not water the fourth lima bean, thus preventing the last of the basic needs.

Prepare a graph which clearly shows the four different plants undergoing their unique experiments. Perhaps your use of a black mark can represent the plant covered with the drape. See if you can develop a way of indicating the other three beans.

Provide water for all of the beans daily except for the one which is denied this substance. Expose all of them to sunlight daily except the one plant. Three of the four plants will receive unlimited exposure to air. The remaining plant, of course, will remain in the air-tight jar.

After a period of weeks you will begin to notice some dramatic differences among the plants. What do you notice about the color of the leaves of the plant denied sunlight? What happened to the seed which was denied soil? How well did the plant grow which was denied exposure to air? How did the plant or seed develop which was denied water? Can you draw some conclusions about the needs of all of these seeds? What can you expect from your plants if you fail to give them enough air, water, and sunlight? What will most likely happen if the soil is poor and lacks proper nutrients? Looking at your graph, how clear and dramatic were certain differences? Were any two of the plants alike in their growth patterns and overall appearance?

Now, add soil to the seed which has had none. Uncover the plant which has been draped with black. Take the plant out of the air-tight container. Begin to water the plant which has been denied this substance. Observe the changes which take place. Record these changes on your graph.

Plant Maze. Take a half gallon milk container and wash it thoroughly. Place some dividers inside so that a maze is formed. Have enough space between the dividers so that a plant can work its way between them. Now, place a geranium plant inside. Cut a door in the side to permit you to water the plant with ease.

Make a graph showing the days of the week only. Project the record for a month or two. Record whether the plant grows through the top of the milk container or not. Be sure that the container sits on a window sill or in a location where it will receive adequate sunlight.

Horizontal Maze. Place a half gallon milk container on its side. Open the end of the container from which the milk is poured. Place a small plant at the other end inside. Cut a door in one side next to the plant to permit ease of watering. Keep a graph of the time it takes for the plant to grow to and through the open end.

What did you notice about a plant's behavior in regard to sunlight? Why does a plant grow toward the source of sunlight? What did you learn from the experiment which denied light to a plant? What does a plant do with the light which it receives from the sun?

Comparison of Food Supplies. Plant three beans, each in a separate container. Allow the bean plants to form and grow to the height of four or five inches. What is the plant using for its food source? If you said that the plant was using the "seed halves", you gave a good answer. But let's find out for sure: that's what a good scientist does.

Remove one of the seed halves from the first plant. Remove both halves from the second plant. Don't remove anything from the third plant. Now make a graph showing their rates of growth. Use inches for the measurement and record your observations daily. You should be able to see some major differences between and among the plants within a period of a week or two.

Which plant grew the best? Which grew most poorly? Which one was in between in terms of growth? Explain what caused these differences.

Explore some other plants which store energy in their seeds:

1. Corn
2. Watermelon
3. Peas
4. Wheat
5. Rye
6. Radish

Exposure to Chemicals. Pollution studies have pointed up the danger of filling our environment with foreign substances. How do plants react to some of these chemicals? The next project will show you the answer to that question.

Grow five bean plants to the height of five inches. Grow five radish plants to the same height. Sprinkle one radish and one bean plant with water to which two drops of iodine have been added. Sprinkle one radish and one bean plant with water to which two drops of hand soap have been added. Sprinkle one of each kind of plant with laundry soap supplemented water. Add shampoo to the water of the next two plants. Place ammonia in the water sprinkled on the last two plants.

As before, with other experiments, prepare a graph. Show clearly the chemicals being given to the five sets of plants. Show their growth rates, outward appearances, and other characteristics.

What did you observe? Which plants grew the best? Which plants had the worst growth rates? Which plants were somewhere in the middle? Which plants looked the healthiest? Which looked the least healthy? What other observations did you make?

Repeat the previous experiment. This time, however, select five different chemicals. Here are some possible choices:

1. Shoe polish
2. Hair spray
3. Perfume
4. Motor oil
5. Insect spray
6. Automobile wax
7. Dish soap
8. Hair bleach
9. Toilet bowl cleaner
10. Metal polish
11. Ink
12. Vinegar
13. Pool chlorine
14. Spray paint
15. Varnish
16. Alcohol
17. Lacquer
18. Paint
19. Silicon spray
20. Deodrant

Be certain that you and your child perform the aforementioned project together. Some of the chemicals needed for the last experiment could be harmful if left to an unsupervised youngster.

What did you observe from doing the experiment the second time? Were some of the radish and bean plants able to grow well despite the chemicals being added to their soil daily? Which chemicals had the worse effects on the plants. What other observations did you make? What woud you conclude about the problems associated with polluting our environment with foreign substances? What would result if masses of plants died? What do people get from plants that mean the difference between life and death for them?

Growth Toward Light. The maze experiment pointed out to you that plants seek the source of sunlight in order to grow properly. Another experiment that points this out is one which involves turning a geranium plant upside down. Here's how to do this project. Cover the soil of a geranium plant with tin foil or some other firm material so that the soil is held firmly in place. Tape the ends of the foil, which overlap the pot, with waterproof adhesive. Hang the plant outside, from a beam or other support, so that it is literally upside down.

Draw a picture of your geranium plant on the day when it is placed outside. Sketch a picture of the plant for several weeks, on a daily basis.

What happened to the plant? In which direction did the stem and leaves grow? How could these parts grow against the pull of gravity? How do most plants grow? In which direction do most of them grow? Is this a mass example of plants growing against the pull of gravity? You made some very good observations!

Use a Magnifying Glass

You and your child can increase your understanding of plants more by conducting a few other simple investigations. Remove a variety of leaves from flowering plants. Examine them under a magnifying lgass to note the network of passages. These tube-like structures carry the nutrients from the soil up into the plant parts. Materials pass from the tiny roots up to the extreme parts of the plant, even to the leaf tips. Look at each leaf carefully. Are the passages similar? What are some of the differences? Why are some tube-like structures larger than others? What would you expect to see in a leaf taken from a very large flowering plant? What would you expect to see in the leaf from a very tiny plant?

Slice a celery stalk lengthwise. Notice the tubes in the celery. What do you think they do to help the plant? Examine the structure of celery leaves. What is similar between these leaves and others you have examined? How are these leaves different? How far up the celery stalk do you think the nutrients travel?

Use a Microscope

Remove a very thin slice of a leaf. Press it between two glass slides under the miscrscope and what kinds of things do you see? What are these basic structures called? If you said "cells" you're correct. These cells are like a pattern of tiles. What is manufactured in the cells for the benefit of the plant? How was this function prevented in one of your other experiments? Remember the one which isolated a plant from sunlight? What do these cells take in from the air? What do they do during the time the sunlight is visible? What do they do at night?

Compare the stems of various flowers. Cut a cross section of several stems. Prepare slides for examination under the microscope. What are the differences between the stems? What do you notice about the cross section of the larger stem? What about the smaller one? Why is this to be expected?

Uproot a few flowering plants. Do this carefully, taking the surrounding soil with them, so they can be replanted following the investigation. Notice which roots are smaller. Are they the ones near the stem or nearer the soil? What is meant by root hairs? How are they different from the main roots? Draw some sketches of the root systems. Compare root systems among many different plants: flowers, vegetables, weeds, and others.

The Travels of Water. Place a piece of celery in a glass of water. Be sure that the leaves are still attached to the top of the celery stalk. Add five drops of red food coloring to the water. This color, or any other bright one, will enable you to see the results better.

Prepare a record of the color's presence in the celery. Make your observations hourly. Now add five more drops of the same color of food coloring to the water in the glass. Continue to record your observations.

Twenty-four hours after the beginning of the experiment, you should see definite results. Cut the celery into pieces. Observe the amount of red that's in the celery. Why isn't any quantity of food coloring anywhere but in the tubes? Cut the leaves into cross sections. What do you notice about the food coloring? Where is it centralized? Why?

The Development of Roots. Cut a piece of blotter paper so that it covers the inner circumference of a glass. It should be five or six inches high in the glass. Place an assortment of seeds between the blotter paper and the inside of the glass. You might wish to choose some of these seeds: radish, bean, pea, grass, corn, and others. Be sure that the bottom of the glass has sufficient water at all times. The moisture will work up to the top of the blotter and provide water to all of the seeds.

What you will see within a week's time will amaze you. Which part of the seeds developed first? What was visible next? In which direction did the stems grow? In which direction did the roots grow? Which parts of the roots developed first, the main or hair?

Continue to experiment for one or two weeks more. Notice the progress of each seed. Observe the direction of growth for the various parts.

Another way to perform the same investigation and verify the results with the glass blotter, is to use two smooth pieces of glass. Place a blotter between the two sheets of glass and your selection of seeds on the blotter. Bind the glass-blotter sandwich together with rubber bands. Stand the instrument on one end in a dish of water. The water will work its way up the blotter to the top. Observe the results of the seeds' growth. Were they the same for both experiments? Did the roots grow in the same directions? Did the stems and leaves grow in the same direction? Did the plants reach the same heights after two or three weeks?

A Close Look At Seeds. Soak a half dozen lima beans in water overnight. Remove them the next day and place them on a piece of tin foil. Carefully remove the skin-like covering from each seed. What do you call this? What purpose does it serve? What appearance did it have until it was soaked in water for an extended period of time? How would it get soaked in water if it were in the soil?

Carefully separate the beans into halves. You'll notice the natural separation where the beans open; it runs along one edge of the seeds. Inside the bean halves, across from the edge which separated easily, you will see a tiny formation. Use your magnifying glass to inspect it closely. What do you see? What are the leafy objects? What would you call the rod-like shape? What do you see at the bottom of the rod-like formation?

What purpose is served by the two seed halves? Think back to your project with the lima beans. What happened when one seed half was removed from a plant? What happened when both halves were removed? What resulted when neither half was removed? What function did the seed halves serve in the growth and development of the bean plant?

Soak other seeds overnight in water. See if you can remove the skin-like covering from them, too. Separate the seed halves. Observe the similarities and differences between and among the seeds. Try to locate tiny plant formations inside the seeds. Try to locate the seed halves of food portions of the seeds.

Plant the Tiny Plants. Test a theory. If food is stored up inside the seeds, then the removal of the food source should affect the growth and development of the seeds. Let's plan an investigation. Soak some more lima beans in water overnight. The next day the experiment is to be followed exactly as it was when the half-dozen seeds were soaked for the observation. Remove the seed covering and separate the seed halves. Discard the food halves. Plant each of the little plant-like formation in leafy loam. Plant a half-dozen regular lima beans in another container of leafy loam. Plant separated seeds, with the tiny formations still attached, in a third container of the same soil.

Prepare a graph. Label the graph with the appropriate title. Indicate in some way a line for each of the three soil containers. Put dates on the base line, day by day. Show inches on the line at the left-hand side of the graph.

Now, record your data for a period of two weeks. What did you learn about the investigation? Did all of the items react in the same way? Did all of the plants with the seed halves removed react the same? What was the result of the seeds which were soaked, opened up, and placed in the soil still attached to the plant-like formation? What happened to the regular beans

which were planted in the normal manner? What would you conclude about planting seeds of any kind from this experiment?

Growing Fruits and Vegetables

The increasing high cost of fruits and vegetables makes a home garden not only a good educational experience but also a money-saving one, too. The two of you can make a visit to the library a good research-gathering project. A study can be made of types of vegetables and fruits, suitable locations for growing, appropriate seasons of the year, kinds of soils needed, feeding and watering schedules, watering needs, insect spraying requirements, and weeding techniques. Good seeds can be purchased at garden supply stores and nurseries for minimum expenditures of money. Perhaps you'll want to decide whether, in the case of fruits, young trees shouldn't be purchased. Growing trees from seeds can take an extended period of time.

Explore soil preparation techniques. Possibly some stones, rocks, pieces of wood, and other foreign matter are in your soil and need to be removed. There is a possibility that your soil is hard and dry. In this case, you and your child will need to break up the dry clots of soil and do some extensive raking. Does your soil need enriching? Manure and other components of rich soil are easy to purchase and easy to apply. In the event that your soil is too sandy, what should you do? How can you overcome the problem of too-rocky soil? What can you work into your soil if the water runs off quickly?

The Actual Planting. What should you do prior to seeding the soil? What process is used to insure that the seeds, once planted, are not too crowded together? Should the seeds be above or below the flow of the source of water? How can you plant the seeds so that the water stays near them for the maximum amount of time? What should you do so you'll remember what you planted in each location of your garden?

Keep a record of your garden fruits and vegetables. Indicate when each source of food was planted. Indicate from week to week the progress of the tiny plants. Show which plants were the first to bloom. Measure and record heights. Draw pictures of the appearance of each variety of food item.

Maintain a schedule for your garden: feeding, watering, weeding, spraying, and soil smoothing. Try to follow your schedule very faithfully to insure that your garden will thrive.

Planting Fruit Trees. There are many, many fruit trees for sale. Some of them are of high quality while others are of less worth. Some library research along with reading gardening magazines, can give you some important information about prudent selections.

Soil preparation for fruit trees is very important. What, for instance, should be done to the soil a day before planting the tree? How deep should the hole be dug? How wide should the hole be? Is there a simple formula for the size of the hole in relationship to to the height of the tree? If you check carefully, you'll discover that there is such a formula. What should be placed in the bottom of the hole to assist the growth of the tree? Should the soil be packed tightly or loosely around the part of the tree near the surface of the soil? What watering procedure should be followed directly after planting the tree? What watering schedule is needed in the weeks and months to follow? What sprays are best to fight off the onset of insects? How do you enrich the

soil in which the tree is planted? Is it necessary to weed the soil? How do you know when the fruit is ready to pick? How and when is pruning done? What are the early signs of a tree in desperate need of water? How can you tell if a tree needs certain minerals? Which kinds of trees can be planted close together in the same area?

Hydroponics

Much has been said, lately, about the possibilities of growing fruits and vegetables in solutions of chemicals. This process is called hyrdoponics. Inexpensive kits are available. In these kits are plastic pots and cone tops. Also included are plant seeds and adequate supplies of food tablets. You and your child can plant the seeds in the special pot containers, add the appropriate water, and mix in the prescribed number of food tablets.

As with the other plant experiments, you'll want to maintain pictorial or graph records of the growth of your living things. Comparisons can be made between plants grown in soil and those grown in the water solution. These can include color, height, number of leaves, quantity of fruit or vegetables produced, and other related factors.

The Wonderful Tree

It is well worth your time to investigate the processes of a tree. There are many fascinating aspects of the development and growth of this large plant form.

Why do some trees lose their leaves in the autum? Why are some leaves in the form of needles? Why do the trees which lose their leaves have brown and orange leaves at certain times of the year? Why do trees ungergo greater growth at different times of the year?

There are numerous types of trees and they are used for many different purposes. Which trees are valued for lumber? Which are fruit producers? Which produce nuts? What parts of trees are used in industry? What kinds of trees were used to add beauty and strength to your house?

What are the purposes of the following tree parts?

1. The bark
2. The leaves
3. The cambium cells
4. The taproots
5. The side roots
6. The root hairs

What are the functions of these things in a tree?

1. Water
2. Minerals
3. Starch

Terrariums

Growing more popular every day is the idea of a closed environment of plants. All it takes to develop a terrarium is a large jar or fish tank, soil, colorful rocks, various plants, and a glass cover to fit over the top of the jar or tank.

It is interesting to develop terrariums to fit different environments. For example, a desert terrarium might include soil on which fine white crystal sand has been placed, tiny desert cactus plants, small decorative rocks, and a sprinkling of light brown sand. Small desert animals can be introduced into the terrarium setting to complete the picture.

A forest setting can be accomplished with soil in which miniature evergreens and low lying plants have been arranged. A thin pattern of white crystal can represent a tiny stream or waterfall.

With your terrarium covered with a sheet of glass, a unique watering system will unfold. As with other plants, be sure that your terrarium is exposed to adequate sunlight. Great creativity can be displayed through the arrangement of the terrariums' contents. Some earthen areas can slope while others can be formed flat. Miniature objects and designs can symbolize natural objects and events. Jars can be selected for their uniqueness, too. Some can be placed upright; others can be placed on their sides or be tilted.

Tiny Plants

Some tiny plants are welcome visitors while others are treated with great contempt. Do you know the benefits and disadvantages of plants in these tiny categories?

Bacteria. There are good and bad bacteria. Can you name the bacteria used in processing cheese, meat, and wine? How do they contribute to the improvement of these products?

What are the names of some harmful bacteria? What great epidemics have been caused by them? What accomplishments have the various branches of science made in the fight against harmful bacteria? Which countries still suffer extensively from the effects of bacteria? What laws have been passed in the United States to protect its citizens against dreaded illnesses? What processes are undertaken with our water to protect us from bacteria? What problems exist, in our country, with bacteria-infested products? How are bacteria located and identified? What scientific instruments are used in the detection of them? What assistance were you given as a small child against bacteria problems?

Mold. When and where have you observed mold? What are its characteristics? What are its harmful aspects? Is any mold helpful? What modern medical discovery has involved a helpful mold? What foods benefit from mold? What fabrics are affected by it?

You can grow mold and observe its interesting actions. All you'll need will be some sterilized jars with lids. If you can locate a petri dish, your experiment will be done more easily and successfully. Into the jar or dish pour nutrient agar, prepared according to directions. Now touch the agar solution when it has begun to harden with a dirty object. If you can sneeze into the solution, that is fine, too. Cover the jar or dish and allow it to sit on a window sill or in some other sunny location. Over a period of days, you will be able to observe some very interesting changes. What formed on your agar? What shape did it have? In which direction did it grow? How many different foreign objects grew? Were they all the same size? Were they all the same shape?

Various Experiments. Now prepare five different agar solutions. Allow each to set until the substance is sticky. Permit the first jar to remain open for five minutes. Touch a moldy orange to the second. Touch the third with a dirty napkin. Expose the fourth to a sneeze. To the fifth, add a drop of sour milk.

Record the results of your experiments. Each of the covered jars (all should be covered) will develop strange and fascinating growths. Draw pictures of the different formations. Keep a record of their unique growth and development.

Magnification of the Growths. Use your magnifying glass and microscope to prepare some simple slides, using the growths in the five jars. Compare and contrast the slides' contents. Draw pictures of what you see through the aid of your instruments. Repeat the preparation of slides to verify that the growth which was prepared the second time looks the same as it did the first time.

Experiment With Mold. Test the reactions of mold to various chemicals. For example, prepare five or more agar solutions. As always, be certain that the jars or dishes into which the solution is poured are sterile. Work quickly so that the hot solution is covered immediately. When, and only when you infect the agar, remove the top or covering from the container.

Expose the first, second, third, fourth, and fifth solutions to the same things that you used in the last experiment. Now add a drop of iodine to the growth in jar number one. Add alcohol to the growth in the second jar. Provide a drop of ammonia for the growth in the third jar. Add liquid soap to the fourth jar, and add one drop of vinegar to the fifth container.

What reactions took place in the five containers? Were any reactions alike? Were any solutions unaffected by the chemicals? Were there any visible color changes? Was any growth reduced in size? Did any of the solutions increase in size? Did any growth divide into two or more separate growths?

Here are some other things which can be added to agar growths to motivate reactions:

1. Ice
2. Hot water
3. Milk
4. Coffee
5. Tea
6. Detergents
7. Disinfectants
8. Insect sprays
9. Mouth wash

Library Research

Some worthwhile library research can develop from your experiments and related topics:

1. Microorganisms
   a. Amoeba
   b. Bacteria
   c. Fungi
   d. Mold
   e. Paramecium
   f. Protozoa
   g. Yeasts

2. Microscope magnification
   a. Ten power
   b. Hundred power
   c. One hundred fifty power
   d. Two hundred power
   e. Five hundred power
   f. Uses of higher and lower powers

3. Microorganisims' characteristics
   a. Shapes
   b. Sizes
   c. Methods of locomotion
   d. Feeding methods
   e. Methods of reproduction
   f. Life cycles
   g. Natural enemies

Plant Reproduction

Some concluding plant experiments can deal with the ways in which plants reproduce. Some are pollinated; others are self-pollinated; some are reproduced from seeds; some require selected parts of the plant to reproduce. Which plants can reproduce from stems? Which can develop from leaves? How can you use the spreading tendency of some plants to cover your bare ground? Which plants require bulbs for growth? What are plant slips and how can they be used to add new plants?

Visits to See Outstanding Plants

First hand observations of outstanding plants can stimulate you to pursue your plant studies further and with more understanding. Here are some prime spots to visit:

1. Botanical gardens
2. Arboretums
3. Flower shows
4. Museums of natural history
5. Parks
6. Private homes
7. Different geographical regions

The study of plants can be as broad and as deep as you and your child wish it to be. Your very own laboratory can exist in the backyard. Experiments are unlimited. Changes can be made seasonally. Second, third, fourth, and fifth generation plants can be only the beginning of breeding for color, strength, and other reasons. The study of plants like the plants themselves will grow and flourish.

Animals Are Exciting

Much enjoyment can be derived from the study of animals. Like plants, animals are unique with different characteristics. Many animal studies can be conducted at home in the privacy of your own home or yard. These investigations can be conducted with limited monetary expenditures.

Classifications of Animals

The library is a good source of information about the various animal classes, animals with backbones and animals without backbones. These two broad categories can be broken down further into very specific groupings. A good topic for your child and you to pursue is the reason for classifiying animals. What is necessary in order to initiate a classification system? Why is it convenient to use such a system? What is done in the case of an animal which fits into several classifications? How many common characteristics must an amimal have in order to qualify for a category? Do land and sea animals fit into the same broad classes?

Protozoa. What are these animals? How can they be identified? Where are they found? What do they eat? What eats them?

Fresh-Water Invertebrates. What can you learn about some of these members of this category: Planaria, sponges, Hydra, Rotifers, earthworms, Tubifex, snails, and clams?

Crustaceans. How are Daphnia, Cypris, Cyclops, Fairy shrimps, and wood lice like the above-mentioned animals?

Insects. What do the praying mantis, Dorsophila, moths, butterflies, beetles, and aquatic insects all have in common? What separates an insect from a reptile? From a mammal?

Fish. Describe the characteristics of a member of this classification? What are the different kinds of fish members? What foods do they eat? What is a food chain for fish like?

Amphibia. Why are frogs and salamanders members of this class? What other members are there? What are their food preferences? What are their natural enemies? How long does the average amphibian live? Where do amphibia live?

Reptiles. What are the characteristics of members of this category? Where do they live? What do they eat? On which animals do they prey? Which animals prey on them?

Birds. Give five examples of birds. What are their characteristics? How do they differ from reptiles? How do they differ from amphibians? What unique characteristic do they share with reptiles? What uniqueness do they have in their bone structure? Why do they migrate? Do all birds migrate?

Mammals. Compare the characteristics of a mammal with those of a reptile. What unique characteristic do mammals have in regard to the birth of their young? What is the differenece between the body temperature of a reptile and a mammal?

Animals and Their Environment

Further library research can uncover some very important points about animals and their environment. How many of these questions can you answer?

1. How are animals related to the places in which they live?
2. What is the "Web of Life"?
3. What specialized ways of getting food do some animals have?
4. How does overcrowding affect animals?
5. What do fossils tell us about early animal life?
6. How have animals developed protection against sickness?
7. How do animals reproduce their kind?
8. What are animal reflexes?

Home Projects

Let's explore some fun activities involving animals which can be done in your home.

Fish Studies. Purchase a small aquarium. Add some appropriate rocks to the bottom of the tank. Fish, like humans, require oxygen. How can you insure that your fish will receive enough oxygen? Provide a pump if you plan to have a large group of fish. What other needs will your fish have? When the water and fish have been added, consider what other requirements are necessary.

Where will you place your aquarium? Why is it important for your tank to have water snails? Are there certain locations for your aquarium which are better than others?

Food Preference. Experiment with your fish to see what they like to eat best. What you'll need is a food graph to record their food likes from day to day. Be sure to title the graph. Have a sequence of days along the base. Indicate a variety of possible foods which your fish might choose to eat: insects, crackers, liver, ground round, sirloin, fruit, vegetables, and other foods. You'll need to cut any type of food offered the fish into very tiny pieces. You'll also want to remove the uneaten food from the tank within a reasonable period of time to prevent pollution of the water.

Identify each fish in some manner. As you introduce the first food item, observe which fish eat that particular food. Later on you might wish to write down how long it takes for certain fish to consume the foods they like to eat. Now introduce the second food item. Record which fish sample it. Continue this same procedure, introducing another food item, until all of the food selection has been placed in the water.

Day by day, observe the results of the same experiment. You'll soon establish food preferences for your fish. How many food items are eaten by your fish? Do they vary in terms of their likes and dislikes? What is the average amount of time needed for the fish to begin eating the food? Is their any relationship between the size of a fish and the amount of food it eats? Which fish seems more active during the feeding process? Do the fish feed at the top or bottom of the water?

Conditioned Feeding. Shine a light into the fish tank each time a feeding is planned. Experiment with the location of the light once a response has been established. At first, however, shine the light on the surface of the water, at one end of the tank. Immediately thereafter, begin feeding the fish.

Do the fish swim to the surface of the water shortly after the light is directed at the water? If so, how many of the fish come to the light? Do any of the fish remain other than at the surface? Maintain a record of which fish immediately swim to the surface of the water after seeing the light.

Experiment with sounds. Ring a small bell over the fish tank before feeding the animals. Tap lightly on one side of the aquarium before feeding them. What other experimental ideas can you think of? How are other animals conditioned like the fish are? What are the values of conditioning? What are the possible harmful effects?

Swimming Through a Maze. Once you have conditioned your fish, it will be interesting to see if they can figure out how to reach the food through a maze. Use thin plastic sheets. Design a simple maze which is high enough to reach the surface of the water. Plan a maze with only two or three compartments, for the first design. Black aquarium glue is easy to use and also visible through the water, making it easy for you to follow the progress of the fish. Put the maze together with the glue in such a way that the plastic compartments are straight and firm. Either have a holding compartment, at the beginning of the maze, which can be opened into the maze when your experiment is about to begin or place all of the fish in the first compartment at the same time.

Now you are ready to experiment. When all of the fish are on the opposite end of the aquarium in the holding compartment or otherwise, shine the light on the water and place food on the water there. Record which fish is able to swim through the right compartments to the food. After this experiment has been conducted several times, begin to time the swim through the maze.

For variety, change the maze in the aquarium from a simple one to a more complicated design. Eventually, you might want to use other types of materials for your maze.

Territory. Where do your fish spend most of their time? Do they all prefer that location? Do some swim all over the aquarium? Which fish spend

a lot of time together? Which fish prefer the surface of the tank? Which prefer the bottom? Do any fish bother the snails? Do any of them eat the water plants? What other observations have you made?

A Pet Cricket

A cricket can be kept in your child's room in a very small cage. The animal will provide you and the youngster with hours of interesting observations.

Now Design the Cage. What type of material will confine a small cricket? How large should the cage be? What will need to be inside the cage? What will need to be outside the cage? How will you provide a door which can be opened easily? How often must the cage be cleaned? Will your design allow this to be done quickly and efficiently?

Obtain the Food. The library is a good source of information about animals and their eating habits. Find out what the cricket eats. Plan how you will get an adequate supply of its food.

Design a Maze. Use cardboard and other simple materials to design a simple table-top maze. Be certain that the sides of the maze are high enough to prevent the cricket's escape. What could you put over the maze to prevent a problem of this nature? Will your selection permit the cricket to breathe properly?

Place the cricket at one end of the maze and the food at the other end. You might need to place a few scraps of food along the maze route the first time to stimulate the animal to action. Time his performance.

Condition your cricket the same way that you did with the fish. Observe its reaction to motivating things such as beams of light, sounds of bells, tapping on the table, and other signals.

A Hampster or Guinea Pig

Animals with fur are generally clean enough to have in the house under normal conditions. It will be up to you and your child to maintain the animal properly.

Rather than purchase a hampster or guinea pig along with a cage, it will be challenging to design and build your own cage. You'll need to know the size of the animal you want to purchase. It is necessary, too, to know the maximum size to which the pet will grow. Inclusion of space for water, licks, food, and other items will be part of your careful design.

Do some research in regard to the habits of your proposed pet. For example, if the animal enjoys romping around, you'll want to build the cage with the appropriate amount of space. If the pet chews on wood or metal to retard the continuous growth of its teeth, a wooden cage might soon be eaten through. If the animal has large quantities of droppings, an appropriate bottom, to allow the waste to drop through, will be necessary. Now what about the placement of the water source? Should it be in a low-lying container or suspended from a bottle contraption? Where should the food be placed? Will the location of water prevent dumping or interference with the animal's exercise routine? What about an exercise wheel for your pet? What should the design include to provide for the maximum amount of use?

Daily Observations. Become aware of your animal and its behavior. When does it prefer to sleep? For how long does it sleep? Where in the cage does it choose to sleep? What foods are particularly liked by your pet? How much does it eat at a given time? Are any food items ignored? Which food selections are found uneaten when you clean the pet's cage? How much water does the animal drink each day? Where in the cage does the animal stay most of the time? Which locations in the cage are visited the least number of times by your pet?

Territory Record. Prepare a record which lists all of the locations in the cage. Be specific. Name the four corners, the four sides, the middle, near the water bottle or container, near the food container, or other locations. Observe your animal for 15 minutes at a time. Place a check mark under the heading which describes where the animal goes. If it goes back to the same location, place another check mark under that heading. Continue this record-keeping process for the entire 15 minutes.

You can be even more specific. For example, indicate what the animal does at each location. Describe how much time it remains there. Attempt to interpret the emotions of the animal when it is in different cage locations, such as excited, sleepy, restless, or other.

Stimulus-Response Study. Attempt to condition your animal the same way you did with your fish. Ring a bell at one end of the cage each time you prepare to feed it. Observe whether the animal comes over to you for the food. Use a soft whistle. A flashlight can also be used. Can you think of other possibilities?

Keep a record of which stimulus conditions the pet best. Record the time which it takes the pet to move to the opposite side of the cage to get the food.

Growth Records. Make a record of height and weight. A small scale can be used to weigh the animal each week. Record the results and notice whether the pet is gaining in weight. Measure the length of your animal, too. Record this information. Determine how much growth is taking place in this area, also. A graph with an appropriate title, can be used for the purpose of recording growth information. A different color crayon or pencil can graphically show the results.

Nutrition Experiment. It is interesting to compare two types of situations. What results occur when a poor diet is provided for an animal? What foods are nutritional? Which are considered to be poor for your teeth, bones, skin, and other body parts? What is a balanced diet? What different vitamins and minerals are supplied by which foods?

Feed your pet a good food diet for one month: grain, lettuce, carrots, celery, turnips, and other wholesome foods. Record the activity rate of your pet: how much he moves, how quickly he moves, which areas of the cage are visited, the amount of time spent sleeping during times when it normally doesn't sleep, the alertness to sounds and other stimuli, and other activity-related aspects of the animal's behavior.

Observe the animal's coat. Is it shiny or dull? Is it full or spotty? What are the features of the pet's nose, eyes, ears, and tail?

Now begin a completely different diet. Feed the animal nothing but candy and soft drinks. It is perfectly satisfactory to vary the diet in the sweets category with chocolate-covered foods, suckers, potato chips, custard, puddings, and other items.

After one month of the candy and soft drink diet make the same observations of your pet that you made when the animal ate a well-balanced diet for a month. Record its activity rate, general appearance, and characteristic behavior. Weigh and measure the animal to gain further information.

Milk Experiment. It is thought that milk makes a significant difference in the diet of an animal. For one month, supplement your animal's diet with a small amount of milk. During the next month, delete the milk from its diet.

Compare the weight and length measurements of the animal during the two months mentioned above. Did the milk make a difference? If so, how much difference did the milk make? What did you determine from the information about the pet's length? Was there a major difference? Which measurement was more different, weight or length? What did you notice during the two month period about the activity rate of the animal? What did you notice about its appetite? Did it use its exercise wheel more during either of the periods? What other observations did you make?

Movement Observations. How does your pet move in the cage? Does it hop, walk, or move in some other manner. Head an observation sheet with the different ways that your pet moves. Now observe it for 15 minutes. Place a check mark under the category which represents the way that the animal moves. Conduct the observation for another 15 minute period. What did you notice about the two different observation periods?

Take your pet out of the cage. Place it on the floor. Observe how it moves in this larger area of space. Does the animal do anything different? What movements are the same in and out of the cage? Which movements are totally different outside of the cage?

Out-of-the-Cage Territory. Where does the animal choose to go outside of the cage? For what purposes, do you suppose, did the animal go to different areas of the room? How many small, quiet areas did the animal visit? How many large, open areas did the pet select? What other observations did you make?

Sunlight Exposure. Place your pet in a location where it receives sunlight five or more hours each day. Record the activity rates and general appearance of the pet.

Now, place the animal in some dark corner of the room where it receives no direct sunlight. Compare the difference in your pet's behavior between the time it was exposed to sunlight and the time it was isolated from the sun.

Train Your Pet. If you have enough patience, you'll be able to teach your pet some simple tricks. The animal needn't do the tricks by itself. It is perfectly satisfactory for it to do the tricks as part of a process to obtain food or other rewards. In fact, you might want to place some of the pet's favorite food at the location where the trick is to be done. Another plan might be to give the animal food after it completes a movement within the trick itself. Eventually, you might want to reward the animal a little bit for the separate parts of the trick and more for the complete trick. Experiment with some ideas for training your pet.

For the first trick, cut a hole, large enough for the pet to enter and exit, in a box. Place a little food inside the box. See if the animal can enter the box and eat the food. Next, cut several doors in a large box. Form a partition behind each door, forming a separate compartment. If you cut three doors, divide the box into three separate compartments. If you form five doors, form five separate compartments in the box. Place food behind the same door each time. See if your pet can learn to identify the correct door to enter.

Design a simple maze, as you did in other experiments. Have food at the end of the maze run. Time your pet. Observe how long it takes for it to find the food. Describe how many wrong turns the pet makes. Record the behavior of the animal when it makes wrong selections: confused, unhappy, unaware, or other behavior.

Now make the maze more complicated. Record the time it takes for the animal to reach the food. Time it several different times. Did the animal run the maze faster after the first time the food was found? What unusual or interesting occurrences did you observe during the course of this experiment?

Animal Interrelationships

How do animals react to each other? Which animals eat other animals? Which animals fly? Which crawl or hop? Which areas of the cage do they prefer? Let's do an experiment to answer some of these questions.

Place a lizard, a ladybug, a snail, a moth, and a fly in a large half gallon jar placed on its side. Punch small holes in the lid to allow air to enter the container. Be sure that the jar contains soil, plants, and some rocks. There should be adequate water somewhere in the container, also.

How do the animals react to each other? Where do the animals go? How do they move? How often do they move? These and other questions will lead you to make some close and careful observations.

Prepare a record sheet. Divide the form into parts allocating one section for each animal. Write observations about each animal. Take five minutes to observe each individual animal. Write down as many uniform comments about each inhabitant of the jar: movement, territory, sounds made, and other important information.

Introduce various foods into the jar environment. Notice the reaction of each animal to the food items. Observe whether some of the animals consume other animals. Record whether some animals refrain from eating the food items or other animals.

Change the animal balance in the jar. Add five snails to each other animal. What differences take place? What happens to the quantity of plants in the environment? Introduce five of every resident. It might be hard to catch five lizards, so any similar animal can be substituted. What results take place? Alter the balance in other ways: remove all of the plant life; add twice as many plants; place everything in a gallon jar; place everything in a quart jar. Experiment with your different relationships. See how creative you can be.

Your Own Zoo

You and your child can become small-time zookeepers. All you need to do is begin a collection of different animals. Perhaps you can start with a rabbit, guinea pig, mouse, hampster, or other mammal. Hopefully you already have one of these animals from your first experiments with animals described above. After you have studied your animal thoroughly, obtain a snake, lizard, or other reptile. Study this animal carefully and thoughtfully. Continue your collection until you have a member of each major classification. If space is limited in your backyard or other outdoor area, keep one animal for a brief period of time. Then trade this animal in for another one. Study this second animal for awhile. Then trade it in for a third type of animal. Contrast and compare the characteristics of the animals in different classifications. See how many distinctions you can draw.

What Other Studies Can You Plan?

You have read some ideas for animal studies. Each seeks to motivate you and your child to do some thoughtful research. There are many more study ideas that might be planned. See how creative you can be. With simple materials you can build an incubator, a trick cage, training apparatus, and other items. Always try, however, to approach your projects from a scientist's point-of-view. Seek to solve a problem; form some ideas about how the experiment can be approached; consult some literature about what others have learned before you; test your ideas; backtrack and make different plans if you encounter problems when you obtain results repeat the test one or more times to see if the results are the same; and take careful notes about the steps involved in your investigation.

Ecology

Have you ever thought about the possibilities for ecology-related projects? Let's examine a few practical ones:

A Model Community

Be a city planner. Here's your chance to design the kind of community which would be ideal for the ecology-minded individual. It would also recognize the life requirements of our precious wildlife species.

First, draw plans for your city much like you drew for the geography unit on maps. Only this time develop the city from your imagination. Include buildings for business and industry in the appropriate locations. Businesses could be located in the urban areas and industry would be situated in the outlying areas. Locate your houses and apartment houses with spacious yard and garden areas. Provide many parks and other recreational areas.

Next provide a creative plan for the effective disposal of waste materials. How will rubbish be transported from your urban area to a disposal facility? How will the trash in that facility be recycled in non-polluting ways? How will the problems of water, land, and air pollution be barred from your model community?

Now provide habitat or wildlife. Where will bushes, trees, grassy areas, and other appropriate cover be placed? How will the wildlife areas be protected from distruction?

Next design beautiful, functional buildings. Incorporate plants within the building areas. Use a variety of natural materials in your structures. Sprinkle the community, business as well as residential, with many beautiful trees.

Will transportational vehicles be allowed in all areas of your community? Will there be bike paths? What means of rapid transit will your community have? Will there be personalized rapid transportation? Where will wildlife preserves be located. How many zoos will you have? In which locations will they be situated?

Recycle Waste Materials

Many reclamation centers have been established to obtain valuable waste materials. Can you name some materials which were once discarded but are now recycled? Did you name several metal ones? Did you identify glass and paper ones, too?

Plan a campaign to collect aluminum cans, newspapers, bottles, and other appropriate recyclable items. Perhaps you'll want to talk to your friends and neighbors about a collection system which you will establish. Maybe they'll offer you some good ideas. Artwork such as posters and leaflets might motivate people to cooperate with your ideas. Decide where the trash items can be stored and how they can be stored. Will you use a cardboard box or a large wooden one? Will glass bottles and jars be stored with newspapers? Will aluminum products be kept together with copper, iron, and other materials? How in your storage plans will bulky items be reduced to more convenient sizes? Will you crush them or store them in their original shapes? What will you do to protect the newspaper in case it rains? These and many other questions will need to be studied carefully.

The location of the nearest reclamation center is a very important part of your project. Where is the center? What references can you use to locate it? How will you transport your items to that facility? During which hours are they open? How much do they pay for various waste products? How often will you deliver the products in light of the cost of gasoline?

Design Ecology-Minded Containers

How many cartons, boxes, cans, and paper items do you and your child place in the garbage can each day? What if containers were designed to be used in some unique way? Can you see some possibilities?

Design containers for the following items: eggs, peaches in syrup, raisins, baby food, milk, and salad dressing. Incorporate some novel ways to dispose of the food containers without throwing them in the trash can. What unique materials could be used? What could you do with the containers in your house? What could you do with them in the yard? How could nature do away with some of them? Can you think of other ways to merchandise these items so containers are not needed in such great quantities? What other ideas do you have?

Weather

A good way to actively involve your gifted child in record keeping, construction, and scientific observation, is through the means of weather projects.

Weather Observations

You and your child can easily observe the weather on a daily basis. Keep a record of rainy days and sunny days. Note cloudy weather, misty occurrences, and other easily observable weather.

Learn the symbols for weather record keeping. Keep a chart or a graph on which to record these symbols. On days when the sun is shining and the sky is clear, place a circle on the graph. Be sure to include the date. On days when the sky is partially cloudy, draw a circle on your graph but shade half of it in with pencil or crayon. On totally cloudy days, color the entire circle. What could you place in the circle to represent rain, mist, or snow?

Become acquainted with the weather maps in the daily newspapers. Note the maximum and minimum temperatures in your city. Read the rainfall to date and compare it with the amount which is considered normal for the year. Note the symbol for wind. How many "hash" marks are attached to the tail? What does each mark symbolize? Where are the high and low pressure systems.

Watch weather reports on the television news programs. What kinds of maps do the weather reporters use? What information do they communicate during their broadcasts?

Construct Simple Weather Instruments

With little or no expenditure of money, your child and you can have your own weather station. Nail a six-inch piece of slender wood to a wooden base heavy enough to support the cross member. Cut a cardboard tail three inches long. Glue this tail to a piece of flat, narrow wood eight or nine inches in length. Balance this piece of wood on the six-inch long upright one. You now have a weather vane. Place it out in the backyard on some flat area. See if you can dermine a way to use the instrument to help you identify the direction from which the wind is blowing.

Nail a thin piece of wood, six inches long, upright on a wooden base. Nail or glue a two inch square piece of wood flat on the upright piece of wood, near the top. Bend a piece of copper wire so it wraps around a nail. One end should point down and one end should point out to where three o'clock would be on a clock's face. Now nail the aforementioned instrument into the corner of the two-inch square piece of wood. Place a nail in the base of the wood. Connect a long piece of clean human hair from the nail in the base of the wood to the wire hanging down from the nail. Adjust the wire which is pointing to three o'clock so that it points straight in that direction. You now have a hygrometer, an instrument which measures moisture in the air. When the air becomes more humid, the hair will stretch, thus moving the wire pointer downward. When the air is less humid, the hair will shorten, thus, causing the pointer to aim upward.

Place a long, glass tube into a bottle which has a rubber cork with a hole in the center. Remove the cork and glass tube long enough to fill the bottle half full with water. Add food coloring to the water to make it more visible.

Now replace the cork top (with the glass tube still in the middle). Place a long narrow piece of white cardboard behind the glass tube. Mark a line even with the height of liquid presently shown in the tube. From day to day, note the height of the liquid. The level will change. Do you know why? How much can you learn about the weather instrument you just made? Why is it called a barometer?

Nail two nine-inch pieces of narrow wood, crisscross. Balance the wood on a 12-inch piece of narrow wood attached to a square base of plastic or wood. Glue one small paper cup, cone-shaped, to the end of each wooden stick. The cups should actually be pierced with the points of the four sticks. Paint one cup with a red line. Have a practical experience with calibration by holding the instrument out of the car window, close to the side of the vehicle, as your parent slowly drives down the street. Ask your parent to drive steadily at the speed of five miles per hour. Record how many times the red cup makes a complete revolution in one minute. Continue to use this procedure to calibrate your instrument. When the anemometer is placed out in your backyard, the number of times that the wind makes your red cup revolve in one minute will give you a clue about the speed of the wind. For example, if the red cup revolves three times in a minute in your backyard, as it revolved outside of your automobile at five miles per hour speed, then how fast is the wind blowing in your backyard? That was easy wasn't it? See if you can determine when the wind in your backyard is blowing ten miles per hour, fifteen miles per hour, twenty miles per hour, and faster than that.

Set Up Your Weather Station. Locate your weather instrument in a convenient backyard location. Observe the functions of your instruments on a day-to-day basis. Also,include your observations about the appearance of the sky daily.

You might wish to add more instruments to you station in order to gather more information. A rain gauge can be made quite easily by placing a funnel over a large plastic container. After a rainfall, pour the contents of the container into a glass beaker which is one inch in diameter. See how many inches of water, in height, the plastic container of water measures. A more scientific way to do the same experiment is to place the tall glass beaker in the plastic container. Locate the funnel over the beaker. Observe the height of water in the tall beaker following a rainfall. This height will approximate the amount of rain which fell measured in inches. The purchase of a maximum-minimum thermometer, which can be placed outside with your other weather instruments, will indicate to you the highest and lowest temperatures for any given day.

Gather Weather Information From Other Sources. You'll want to verify some of your weather observations by calling professional weather sources. Here are a few reliable agencies to contact:

1. Local radio stations
2. Television stations
3. Weather bureaus
4. Newspapers
5. Airports
6. Observatories
7. University weather stations
8. Military bases

Photograph Cloud Formations. Use your photography background to initiate a collection of cloud photographs. Learn the different formations: cumulus, nimbus, and cirrus. Study the combinations of these three basic varieties.

How high do cumulus clouds form? What is the appearance of cirrus clouds? How can you recognize nimbus formations? Which cloud type threaten airplane pilots with strong, unpredictable winds? Which cloud type is low and extensive? Which cloud type appears to be light and airy?

Predict weather from your observations of clouds. Predict which clouds will bring rain, clear weather, a change in the temperature, a day or two of cloudy weather.

Construct a Diorama. Emphasize cloud formations. What material can you use to represent clouds? What can you do to this material to make the clouds seem flatter? What can you do to make the material seem darker? Feathery? How can you show airplanes traveling through various formations? What other ideas do you have?

Create Your Own Clouds. Place ice cubes in a jar. Screw the lid on the jar and observe what forms on the outside glass. After several minutes another interesting thing will happen. Can you explain how this experiment is similar to what takes place in the formation of clouds? Examine your plants in the jar with the glass cover. How are the results of the ice cube experiment similar to a process which is taking place between the plants and the glass cover?

Research Other Weather Elements. How much can you learn about the following weather-related topics?

1. Winds
2. Fog
3. Dew
4. Rain
5. Sleet
6. Hail
7. Snow

Machines

The progress of machines, throughout the ages, has been rapid at times and slow at others. What benefits do we receive from the various classes of machines? Which machines do you use each day? Which do you use each week? Why do you use some less often than others? How do machines help you at school? How do they aid you at home? Which ones are used by business and industry?

The Screw

What are some examples of machines which employ the principle of the screw? What is the principle of the screw? How does this principle apply to road-building? How is it related to stairways? Draw some pictures of machines in this class. Build a model of a screw machine.

Incline Plane

What is the principle of this class of machines? Draw a picture of two machines using this concept. How does the local market benefit from this principle? How do people confined to wheel chairs benefit from buildings which incorporate this principle? Compare the difference between an incline plane and the direct lifting of weight through the following experiment:

Attach a string to a bundle of books. Tie this string around a spring type scale. Lift the bundle of books to a certain height. Record the reading on the spring scale as the books rise to the desired level. Now place a board from the bottom of the lift to the level to which the books were lifted with

the spring scale. Pull the books, with the spring scale still attached, along the board to the desired height. Record the scale reading as you perform the experiment. Which method used the greater amount of energy?

Friction. Place the same bundle of books, still attached to the spring scale, on a table. Elevate a wooden board to the height of one foot. Be certain that the board is securely situated. Now elevate another board to the same height. You should now have two separate boards elevated to the exact height of one foot. Now, place vaseline along the surface of one board. Place nothing on the other board's surface. Pull the bundle of books along the vaseline-coated surface to the height of one foot. Record the amount registered on the spring scale for the highest reading during the experiment. Repeat this experiment. However, this time pull the bundle along the surface of the non-coated board. What did you notice between the recordings of the two boards? Why was the vaseline-coated board different from the non-coated one.

Glue strips of sandpaper to the surface of the vaseline-coated board. Repeat the experiment mentioned above. What affect was created by the sandpaper? Repeat the experiment using sandpaper strips on one board and nothing on the second board. What differences occurred? How can you explain this?

Polish the top of the table with furniture wax. Leave a similar table unpolished. Push a toy car along the top of the polished top and record the distance that the car traveled. Push the same car along the top of the same type of table, but unpolished, and record the distance traveled by the car. Be sure that the car is pushed with the same amount of force for both experiments. What did you observe about the benefits of the polished table top? What are the advantages of smooth surfaces? What are the dangers and other drawbacks?

Now place fine sand on the polished surface. Push the car across the table's surface. Record the distance the car traveled. Push the same car along the non-waxed or polished surface. Compare this distance with the one traveling over the fine sand. What can you determine from this experiment?

The Screw

You and your child can probably recall the advantages of placing a screw into wood gradually; each turn penetrated the material more and more until the last turn of the screw driver was experienced. What other machines employ the principle of the screw? If you become stumped, look through the kitchen utensils for machines which utilize the screw.
screw.

Screw Worked into Wood. Attempt to twist a screw into a piece of medium-hard wood. Now repeat this experiment with the aid of a screw driver. What happened? Which experiment was easier? Why?

Lever

Pry open a can with a lid top. What kind of instrument did you use to accomplish this task? What other instruments could you have used? Figure out how to lift a heavy rock without picking it straight up. How did you accomplish this feat? What instrument did you use? How is this instrument similar to the one you used to pry the lid off the can? What category of machine do all of these instruments represent?

What other types of levers are there? Draw a picture of a lever in operation. Preparations can be made for a panorama showing people using levers to remove large boulders without the aid of heavy machinery. Draw your sketches first. Where will the people be standing? What will be shown in the foreground and background? Where will the boulders be located after they are moved? What will the people be wearing? Now show the panorama on a large piece of cardboard or wood. Dress the people in fabrics from discarded clothing. Place soil on the base of your panorama. Simulate trees, bushes, grass, and other natural items. Create your boulders from some materials which appear like these objects. Use paint and other art materials to create the various details of the project.

Wheel and Axle

How did the invention of the wheel simplify the work of early humans? What machines utilize this principle? What different varieties of wheels exist today? What different kinds of axles are there in use? What are the disadvantages of wheels made from wood and cement? What are the advantages of rubber tires? Which is better and more comfortable, a wheel of solid rubber or one of air-filled rubber? Why?

Draw pictures of wheels in action. Who uses the wheel and axle to lift water from a well? Which industry uses the wheel and axle principle in almost all of its products? Which other industries employ the wheel and axle? How does the egg beater use this principle, too?

Model Cart. You and your child can gather some valuable information about early carts and wagons from the local library. Build a model of a cart. Simulate the wheels and axles. Observe some of the problems using wooden wheels and axles. What problems of friction are created in the cart? How can some of these problems be reduced? How has modern day science eliminated or reduced some of these basic problems?

Comparison of Wheels and Axles. Push your cart along the table top, as you did in a prior experiment. Record the distance traveled by the cart. Push the car with rubber wheels along the same surface. Which vehicle traveled farther? Why?

Repeat this same experiment on a polished table top. Did the results change? Why or why not?

Pulley

Experiment with a simple pulley. How is the pulley like the wheel? What is the major difference? What purposes are served through the use of pulleys? Do some reading about double pulleys. What happens as the number of pulleys added to the experiment is increased?

Hayloft. Build a model barn. Attach a simple, single pulley to the barn's hayloft. Pull a load of hay from the ground level to and into the hayloft. You'll need to direct the hay once it arrives at the loft opening. Attach a spring scale to the end of the string tied to the hay load. Pull the load straight up to the loft without using the pulley. What amount registered on the scale? Now use the pulley. Attach the spring scale to the part of the string which goes over the pulley and back down to the ground. Pull the load to the loft in this manner. What reading did you observe on the scale? What is the advantage of using a pulley? What other uses on a farm are there available for pulleys?

Space Science

This century has been a dramatic one for space science. Perhaps, you and your child have watched launches, landings, space returns or recoveries, and other significant events. This background will add greatly to an indepth study of space principles.

Rockets

Rocketry can be an exciting beginning to the study of this area of the sciences. Some basic principles can be researched at the library. What are the parts of a rocket? What different kinds of fuels are used. Why are different kinds needed? What are the advantages of larger rockets? What experiments have been made with multiple rocket launches?

Balloon Rockets. Blow air into a rubber balloon. Release the object. How did it behave similar to a rocket? Why was it like a rocket when inflated with air? Why were the parts of the balloon comparable to those of a simple rocket? Launch your balloon rocket from a table top. Try the same thing launching it from the floor. Throw the inflated balloon into the air. How were your launches different? How were they alike?

Balloon Rockets on String. Tie a piece of string, at the same height, from one end of the room to the other. Attach a balloon to the string, using pieces of soda straw. Thread the string through the straw pieces. Then scotch tape the balloon to the straw pieces. If this has been done correctly, the uninflated balloon will move along the string when pushed by your fingers. Attach a balloon to the other end of the string, on the opposite side of the room. Blow air into one balloon until it is half-inflated. Release the balloon without pushing it. Measure the distance which it traveled. Now repeat the experiment with the other balloon. Measure the distance traveled by this balloon. Inflate the first balloon completely. Release it and measure the distance it traveled. Do this with the second balloon. Is there any relationship between the amount of air placed in the balloons and the distance they travel? Explain your findings.

Rocket Direction. Place three short pieces of soda straw in the end of a balloon. Use a rubber band to fasten the straws securely into the balloon. Inflate the balloon. Place it on the table top and release it. Why is this launch different than the ones before? Why is this flight lasting longer? Why is the direction more predictable?

Fasten one piece of soda straw in the balloon with two inches sticking out from the end. Inflate the balloon and release it as before. Now bend the soda straw so it points to the left. Launch the balloon again and observe the reaction. Bend the straw to the right. Launch it and observe the results. How were these launches alike? How were they different? What can you conclude about directing the flight of a rocket? Repeat each of these experiments several more times to verify the results. Were your findings reliable? Draw additional conclusions that you may have formed at this point in your rocketry experimentations.

Rocket Fins. Attach some light rocket fins to the sides of your balloon rockets. Note the affects that are produced by these additions. Attach fins to the string rockets as well as the ones launched from the tables and ground.

Model Rockets. Design some modernistic space rockets. Attempt to incorporate the principles of design that you have studied in the library. Add features consistent with the launches that you have performed with your balloon rockets. Have detachable stages. Have cut-aways that can be lifted off to dislocate the rockets' interiors.

Water Rocket. Attach a tin can to a piece of string. Be certain that the can is evenly balanced. Punch some holes in the sides of the can near the middle and bottom of it. Pour water into the can, all the way to the top. Observe what happens to the can as the water pours out through the holes. What principle of rocketry did you witness?

Milk Carton Rocket.Fill a small milk carton with water. Attach a long piece of string to the carton's top. Be sure that the carton can rotate or revolve easily on the string. Punch small holes in the sides of the carton near the middle and bottom of the container. How are the results similar to the ones obtained from the former experiment?

Dry Ice Rocket. With adult supervision, place a few pieces of dry ice into a milk carton. Add water to the dry ice. Attach string to the top of the carton as you did in the other experiments. Punch small holes in the sides of the carton near the middle and bottom of it. Observe the results of the experiment. How was the outcome of the dry ice and water rockets alike? How were the results different?

Vinegar and Baking Soda Rocket. Place a quantity of baking soda in a piece of tissue paper. Pour vinegar into a test tube. Place the test tube on a number of pencils so it is completely off the surface of the ground. Push the tissue-wrapped baking soda into the test tube of vinegar. Place a cork into the end of the test tube and observe the reaction. Measure the distance that the test tube moved foreward. Repeat the experiment. Make sure that the same amounts of vinegar and baking soda are used in each experiment. What conclusions do you have about the experiment?

Now double the amount of baking soda used in the experiment. Measure the results of several trials of this investigation. What resulted from doubling the quantity of baking soda?

Finally, triple the amount of baking soda used. What resulted from this experiment? Repeat the triple-portion experiment several more times. Were your results reliable? What can you conclude about the relationship between the amount of baking soda used and the distance traveled by the test tube rocket?

Gliders and Airplanes

Information about the flight of objects can be gained from experimenting with gliders and paper airplanes. Your child probably has folded paper into airplanes on many occasions for the sheer pleasure of seeing space flight. Why not capitalize on the natural curiosity of the child? Why not work with your child to develop a variety of paper airplanes? See how long one can stay aloft. Time it. Try the experiment over and over again to verify the number of seconds it glides through the air. Now develop other models: sleek ones, broad ones, combinations with attachments, with weights attached to various airplane parts, and ones with your own unique innovations.

Create cardboard gliders. Experiment with the weight of different types of cardboard. Explore the variety of shapes and sizes possible. Time the flight of these airships, too. Attempt to attach a simple rubber band motor to your cardboard glider. Be creative, shape a propeller; fashion attachments for the rubber band; select the appropriate kinds of supports for the engine; pick the lightest weight of rubber band.

Now experiment with distance. Fold a variety of paper airplanes. See which one can be thrown the greatest distance. Repeat the distance trials several times with each airplane. Record your information on a graph. Vary the ways of showing the same information of the graph. Be creative.

Experiment with your cardboard gliders to achieve distance. Perform many trials to verify the accuracy of your information. You and your child can work cooperatively on the aforementioned experiments. Put your heads together for this fun-type project in space flight. Incorporate mathematics in measuring the distances traveled by your aircraft. Use a second-hand to accurately tell the time spent aloft by your respective gliders and paper airplanes.

Launch your gliders and airplanes from various heights. Perform some trials during windy days; perform others during calm, windless times. Draw conclusions about the relationships between airplane and glider shapes and their abilities to remain aloft and travel great distances through the air.

Carbon Dioxide Rockets

Tie a piece of string between two trees or poles 50 or more feet apart. Be certain that the string is taut and secure. Attach a carbon dioxide cylinder securely to the string. Use a carbon dioxide puncturing device to activate the rocket. The result of performing this act will amaze you greatly. How is this experiment similar to the one which involved balloons? Which experiment had more-compacted gas? Which met less air resistance? Which object traveled faster?

Repeat this experiment. This time, however, slope the string upward. Puncture the cylinder. Observe the results. Did the slope prevent the capsule from traveling along the string? Did the cylinder travel as fast this time? What other changes, if any, did you observe?

Let's Use Space-Related Instruments

Many simplified space instruments can be used successfully by you and your child to further enhance your study of space and related topics. Let's look at a few of these instruments and how they can be used.

Shadow Stick. Nail a six-inch length of thin round wood to a wooden base. Be sure that it is nailed in an upright position. Now place this instrument on some flat area in your backyard. You and your child can observe that the sun causes the stick to cast a shadow and record the time of day. Come back to the instrument in an hour and make a mark at the end of the new shadow. Repeat this hourly. What do you have on the ground? How far apart are the lines? Are some lines longer than others? What do you think ancient peoples did with the kind of information available in this manner. What does this experiment tell you abut the Earth? Is it traveling around the sun? What other information did you gather?

Sun Dial. Cut a wooden base four inches long. Use thin wood for this part. It doesn't matter how thick the wood is as long as it's at least a half inch or so thick. Cut a piece of wood four inches long. Use thin wood for this part. This piece of wood should be cut further so it is in the shape of a triangle. Glue this triangular piece of wood on its side, starting at one end of the base. Be sure that the triangle is placed in the center of the eight inch long base. You should now have a base with a triangular shaped piece of wood extending half of its length.

Place this instrument in your backyard. Observe where the shadow falls. Make a line at the end of the shadow and record the time of day. Repeat this process hourly. Can you tell time on a sunny day, using your instrument? Try to use it as a clock or watch. What will make this instrument less accurate during certain times of the year? How will the seasons affect it? How will daylight saving time affect your instrument?

Star Finder. Cut a piece of wood eight inches long and one-inch wide. The wood need only be one-inch thick. Nail a piece of wood two inches wide and six inches long to it to form a gun-like object. Attach a metal protractor, turned upside down, to the eight-inch long piece of wood about half way along its length. Place a nail in the protractor, exactly in the middle. Finally place a nail near the end of the eight-inch piece of wood. It should now appear that you have a wooden pistol with a nail gunsight. From the center of the barrel is an upside-down protractor with a nail place in the center of it. The last step is to hang an eight-inch piece of kite string, weighted with a light metal washer, from the nail in the center of the protractor.

When the pistol is held straight, the string hangs along the zero part of the protractor. When the pistol is aimed at a tree, star, airplane, kite, or other object extended into the air, the string hangs along a number. This indicates the amount of angle from zero. You can readily tilt the pistol or star finder 10, 15, 20, 25, 30 degrees and so forth.

Now consult your local newspaper regarding a star formation, planet, or other heavenly body. Note how high above the horizon the particular object can be found. Now, using your star finder, a flashlight, and patience, tilt the star finder's sight the appropriate number of degrees above the horizon. When you have tilted the instrument exactly the correct amount, scan the heavens for your object. You will soon become an expert at locating stars, planets, space satellites, comets, and other exciting celestial objects.

Star Map. Punch holes in the bottom of a paper cup in the shape of some formation of stars such as the Big Dipper, the Little Dipper, or others. Go out at night when the stars are bright and the sky is clear. Place the head of a flashlight into the cup. Turn the bottom of the cup so it faces you. Turn on the flashlight and search the heavens for the star formation that looks like the one punched in the cup bottom. You will learn many star formations from the many cups that you will prepare for this project.

Triangulation. Place a yardstick on a table so that it is flat. Attach a soda straw so it is attached firmly on the 12-inch mark. Attach a straw which moves back and forth over the 24-inch mark on the yardstick. You should now have a yardstick with a fixed straw placed across its 12-inch mark and a movable straw attached to the 24-inch mark. Lift the movable straw off and place a protractor so that the zero point is in line with the 24-inch mark.

Place the movable straw back on the 24-inch mark. This straw should now be on the protractor's zero mark.

Now let's use your triangulation instrument. Look through the fixed straw. Focus on some object, straight ahead. If you can find none, slide your yardstick to the left or right until one comes into view. Once you have sighted the object through the fixed straw, move the movable straw until you can sight the same object through it, too. How many degrees did you have to turn the movable straw? Remember, that straw has a protractor under it. That straw is sitting on the zero line of the protractor. How many degrees to the left did you move it?

How can you determine the distance of a sighted object without measuring each time? Here's a hint: place an object 10 feet in front of your triangulation instrument; sight the object as mentioned before; observe and record the number of degrees the movable straw was turned. Let's suppose you had to turn it five degrees. Place an object 20 feet out from the triangulation instrument. Sight it and record the number of degrees the movable straw was turned. Do you have a hint? See if you can calibrate your instrument in this way. Make a chart from your findings. While your measurments won't be accurately to the inch, they will give you rough estimates in a hurry.

How do scientists use triangulation? How do surveyors use this technique? What other people use this instrument for their work? For what recreational reasons is it used?

More About Space

How much do you know about the other eight planets? How many of these questions can you answer at this point?

1. Why would life on Mercury be highly unlikely?
2. How old would you be on Mercury?
3. What strange characteristic does Venus have?
4. What does the gravity of Venus have in common with Earth?
5. How does the temperature on Mars compare with ours?
6. What unique color is visible on Mars?
7. What are the clouds on Jupiter believed to be composed of?
8. How large is Jupiter compared with our planet?
9. What are the rings of Saturn made of, according to what scientists believe?
10. What is the temperature on Saturn?
11. How much oxygen is there on Uranus?
12. Which planet has more light, Uranus or Earth?
13. How much oxygen is belived to be on Neptune?
14. Which things could live on Neptune?
15. How well can scientists see Pluto?
16. What affect does Pluto's distance have on its temperature?

These and other questions can lead to in-depth studies of our fascinating neighbors in space. For example, which planets are believed to offer the best chances of supporting life? Which have conditions that would likely prevent even brief explorations? Which are so distant that tremendous amounts of time would be necessary to reach them?

Model of the Planets. Select nine clay balls which will represent the nine planets. Add rings to Saturn. Show the relative sizes of each. Show the colors of the ones which are known for their color characteristics. Place the sun in the center of your model. Locate the planets in order of their relationship to the sun. Which is closest to the sun? Which comes next? Considering distance, which is in the center of the nine planets? Which is the most extreme distance from the sun? Which ones have their own moons?

Distance Relationships. You and your child can perform the next investigation best in a spacious park area. Bring your clay models of planets to the park with you along with a tape measure and the record of the distances of the planets from the sun.

Use your sun as a central focus point. You'll be placing all of the planets on one side of the sun for simplicity. Now develop a scale. Maybe you'll want to place a planet one inch from your clay sun for every million miles it is actually located from the real sun. Spread the planets on the park's lawn in the relationship of one inch from the sun for every million miles of actual distance. What did you learn from this project? Are the planets all the same distance from the sun? Is there any pattern that you see?

Now place the planets on the park's lawn in a new relationship. Let one half inch represent each million miles that the planet is actually away from the sun. What did you observe from this experiment? Did the new relationship change anything? Is Mercury still the same relative distance from the sun, compared with Pluto as it was in the former experiment? Can you see any pattern in the distance of the planets from the sun?

The Moon

Earth is one of the planets in our solar system with a moon of its own. Your child and you might do some research to answer some broad questions about the moon:

1. Is it larger or smaller than Earth?
2. What did it come from according to what we know?
3. Of what is it made?
4. Is it lighter or heavier than Earth?
5. What are its phases?
6. What parts of the moon do we see?
7. What causes high tide?
8. What causes low tide?
9. How long does it take the moon to travel around the Earth?
10. What caused the many craters on the moon?
11. Why does the moon appear to glow?

Gravity

Explore the various sizes and densities of the other planets. Involve your mathematics through calculations about how heavy you would be on the various planets and on the moon. Take your weight as it exists on earth. How much would you weigh on Mars? How much would your child weigh on Mars? How much would each of you weigh on Jupiter? What would your individual weights be on Saturn? Calculate the appropriate figures for each of the other eight planets and our moon. You can do some creative day-

dreaming about jumping over buildings, throwing boulders, and performing other feats on various planets. You'll also want to consider planets on which you will weigh more. What problems would likely develop on these heavenly bodies? Would you use more or less energy to perform everyday chores?

Let's do a few gravity experiments to learn more about this important topic. First fill a paper cup half-full of water. Punch two small holes near the rim of the cup on opposite sides of the container. Take a long piece of string. Bend it in the middle so both loose ends hang down equal distances. Tie one end to the one hole and the other end to the remaining hole in the cup. Now lift the cup, holding both strings at the very end where the bend was originally made. Swing the cup rapidly in a circle. What happened to the water inside the cup? Why didn't it spill out? Repeat the experiment swing the cup with a slow, easy motion. Did the water spill out this time? Why not?

Now empty the cup. Place 10 or 15 small stones inside. Repeat the cup-swinging experiment. What happened to the stones? What did you think would happen? Can you explain these strange results?

Finally empty the cup. Fill it to the top with water. Swing the water-filled container around in a circle. Observe the results of this experiment. What can you offer as an explanation about why the water didn't spill? How can you connect this result with the idea of gravity?

Space Travel

The many space explorations which have been conducted by our country have involved relatively short periods of time. Your child and you can spend many enjoyable hours exploring some of the problems connected with space travel. How many of these will your child and you be able to resolve?

1. How can food be preserved for long periods of time?
2. Where will oxygen supplies be stored?
3. How will exercise be provided to keep muscles in shape?
4. How will foods be prepared?
5. What means of eating food will be developed?
6. How will radio communication be maintained with Earth?
7. What provisions will be made for illnesses and accidents?
8. How will waste products be discarded?
9. What fresh fruits and vegetables will be carried in the space ships?
10. What animals will be brought on the missions?
11. How will the space travelers be protected against radiation?
12. What tools will be needed?
13. How will the travelers be kept aware of current world events?

Your involvement with space travel will be reinforced through the development of related models. Here are some ideas which might warrant library research and then be followed with construction and other art projects:

1. Construct a model planetarium
2. Build a workable, model telescope using inexpensive lenses and paper towel cardboard tubes
3. Construct miniature moon rovers and other moon vehicles

4. Build a model of a moon community complete with shelters, communication equipment, storage buildings, and other structures
5. Develop a miniature space suit
6. Construct dioramas and panoramas showing planets, star formations, and space ships
7. Construct a suspended solar system
8. Make a star model showing different sizes, shapes, colors, and locations in the heavens
9. Develop a display of colors showing variations in ability to absorb and reflect light

Take Some Space Science Field Trips

See some professional displays of space science projects. Here are a number of places to visit:

1. A local planetarium
2. A museum of science and industry
3. A space center
4. Business and industry space sub-contractors
5. Open houses at colleges and universities
6. Lectures given by space scientists
7. Space film and slide presentations
8. Military bases
9. Rocket clubs
10. Space museums
11. Surplus stores

Some colorful information can be obtained through the mail. Some sources of useful letters, pamphlets, and pictures include the following:

1. NASA
2. Aircraft companies which do sub-contracting work for areospace firms
3. Astronauts
4. Space scientists
5. Space Project directors

Magnetism-Electricity

Closely related to space science, and other branches of science, is the study of electricity-magnetism. Experiment with different kinds of magnets, bar and horseshoe. Take the largest magnet. Does it attract the largest number of steel pins? Was it able to attract all of them? Make a record. Begin with the smallest magnet. Indicate the total number of pins it attracted with one attempt. Now use the next magnet to perform this investigation. Record the number of pins that it attracted. Continue until all magnets have been used one time. Was the greatest number of pins gathered by the largest magnet? Did the smallest magnet attract the smallest number of pins?

Move a Magnet Through Soil. Visit a sandbox. Run your magnet through the sand. What collects on it? Try this same experiment in soil. What did your magnet attract? Did it gather the same material in both the sand and the soil? What is this strange substance? It is all over the Earth as well as in its core.

Magnetic Waves. Place a magnet on a table. Place a firm piece of transparent plastic over the magnet so it covers it completely. Now, pour the material that you gathered in the sand and soil on to the plastic, using a salt shaker. Hold the salt shaker high above the plastic sheet. What are those strange lines

and curves which formed on the plastic? You'll want to do some research to discover the answer to the mystery. Remove the plastic sheet from the magnet. Do the lines and curves remain? Tilt the plastic sheet. Did the lines and curves remain in place? Repeat this experiment, but instead of covering the magnet with plastic, use paper. What resulted from this variation of your experiment? Use a different kind of magnet. If you used a bar magnet, now use a horseshoe magnet and if you used a horseshoe magnet, now use a bar magnet.

What Magnets Will Attract. Select a variety of materials: an eraser, a piece of tin, a rubber band, a plastic comb, a ribbon and other objects. Write the name of each object on a record sheet. Move your magnet near each object separately. If the object is attracted to the magnet, place a check next to its name on the record sheet. If the object isn't attracted by the magnet, place nothing next to its name.

Will Magnets Attract Through Objects? Place a piece of thin plastic between a magnet and something it will attract. What is the result? If the object is attracted, place a thicker piece of plastic between the magnet and the object. Record the new result. Continue this experiment using rubber, cloth, aluminium, and other materials between the magnet and what it normally will attract. List those things through which the force of the magnet will penetrate.

Electro-magnet. Connect a copper wire to one terminal of a dry cell battery. Connect the other end of the wire to the dry cell's other terminal. Now take the wire in the middle, using gloves, and wrap it around a large steel mail. Place some steel pins near this coiled wire and observe the reaction. How many pins were attracted? Now disconnect one terminal and pull the wire away from that area. What happened to the pins? How many winds of wire are there around the nail? How many pins did this number of winds attract? Record this information. Now wind the wire around the nail five more loops. Test your nail with the pins. Be sure that the disconnected terminal is reconnected again. How many pins were attracted? Record this information. Continue to wind more and more wire loops around the nail until you have wound 25 or 30 of them. Examine your information. What did you learn from this investigation?

Generating Electricity. Wind a long piece of copper wire into 30 or 40 loops. Place a compass on the table near the wire. Wrap several loops of wire around the compass. You should now have 30 or 40 loops of wire with some wire leading a short distance to a compass. The compass should be wrapped with several winds of the same wire. Now pass a bar magnet in and out of the coil of wire. Notice the reaction of the compass. How can this be explained?

Other Related Areas to Study. The area of electricity-magnetism opens the door to many stimulating investigations which can be done in your own home at little or no cost to your child and you. Here are some exciting areas and topics to explore:

1. Alternating current
2. Direct current
3. Hydroelectric generating plants
4. Stream generating plants
5. Nuclear energy
6. Simple circuits
7. Series circuits
8. Parallel circuits
9. Insulation
10. Generators (step-up and step-down)
11. Condensers
12. Motors
13. Conductors
14. Transmission stations
15. Wiring
16. Simple electric equipment (bells, buzzers, and bulbs)

Construct some simple machines using the principles of electricity and magnetism:

1. Wig-wag motor
2. Telegraph
3. Perpetual motion machine
4. Crystal radio
5. Solar cell

The Unlimited World of Science

The world of science is in fact unlimited. The areas of study and project ideas listed in this chapter only touch the surface of the possibilities which exist for your gifted child and you. Few areas are as naturally motivating and deeply stimulating as this subject. Take advantage of its potentials for learning. Enjoy it to the maximum, and through that enjoyment you and your child will appreciate each other and open those important lines-of-communication more and more with each passing day.

EPILOGUE: THE BEST IS YET TO COME

The Lines Draw Closer

If you have approached the ideas in this book regularly, the lines of communication between your gifted child and you have already drawn closer together. The project ideas have produced many, many hours of enjoyable learning. You've found that many of the suggestions could be modified or even skipped until a later time.

A time with your child, daily or several times each week, has become established. You and your youngster have taken many field trips to the library and other places of interest.

The involvement of the two of you has become a smooth and flowing relationship. Words cannot describe the benefits derived from this new association, but just think the best is yet to come!

The End

Title IV of the Civil Rights Act of 1964 states:

"No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, or denied the benefit of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

Therefore, federal programs must be operated in compliance with this law.